

June 1939

Work on Presidio Approach to Golden Gate Bridge Speeds Up

By T. E. FERNEAU, Resident Engineer

EARLY in 1935 negotiations were started to obtain a permit for constructing an approach to the Golden Gate Bridge through the Presidio of San Francisco. The Golden Gate Bridge and Highway District and the city of San Francisco conducted these early negotiations, while the Division of Highways took no active part. Early in 1937 it was agreed that the work should be done by the Division of Highways and negotiations with the military authorities were assumed by the Division. The greater portion of the negotiations were carried on personally by Col. Jno. H. Skeggs, District Engineer of District IV.

Many major and minor difficulties had to be met and dealt with before the U. S. Army authorities issued a permit on July 27, 1938, allowing construction of the highway within the Presidio.

The new approach is to extend from the intersection of Lake Street

and Park-Presidio Boulevard on the south side of the Presidio to the Marina approach to the Golden Gate Bridge. The length of the main approach is 1.44 miles, but with the addition of two off ramps and two on ramps at the bridge connection the length will total 2.10 miles. Of this length 2.03 miles are located within the Presidio boundaries.

APPROACH IS FREEWAY

A requirement of the Army permit is that the approach be a freeway through the Presidio with no access except at the termini.

In two instances where Presidio roads cross the new alignment, relocations of the roads are to be made passing under the new viaducts. Right of way is limited to toe of slope in cuts, top of embankment in fill, exterior faces of retaining walls and outer railing of viaducts. However, the Division of Highways is required to plant and permanently

maintain all slopes outside the actual right of way lines. Title to ground underneath all viaducts and over a section of road in tunnel remains with the Army.

Distribution and segregation of traffic from the new highway to and from the Marina approach to the Golden Gate Bridge is to be handled by two on, and two off ramps, all of two-lane roadways. These distribution roads permit vehicles coming from any direction to turn towards their ultimate destination without crossing another traffic stream. No pedestrian facilities will be provided, although it is necessary to construct two pedestrian underpasses for relocations of the sidewalk on the existing Marina approach to the Golden Gate Bridge.

COST IS \$1,500,000

Financing is provided from gas tax funds and a PWA grant of \$800,000 accepted by the State on August 19, 1938.

General view of main Funston Avenue approach to Golden Gate bridge through Presidio looking south from intersection of all traffic distribution ramps.





Erecting steel form jumbo preparatory to pouring arch for tunnel under Presidio golf course and Washington Boulevard.

The cost of the entire project was originally estimated at \$1,789,100. Savings of nearly \$330,000 have been made in bids on four contracts to date, and it now appears that the completed project will cost less than \$1,500,000.

The various phases of construction have been divided into units as follows:

Type of work	Contractor	Per cent complete May 27, 1939	Estimated completion Date
Grading and 1300 ft. of tunnel	Macco Construction Co.	31	Dec., 1939
Three viaducts totaling 1288 ft.	Union Paving Co. "A," "B" and "C"	20	Dec., 1939
Highway underpass-- 2 pedestrian underpasses	M. J. Lynch "D," "G" and "H" and Viad. "E"	0	Dec., 1939
238 ft. viaduct	Union Paving Co. Viad. "F"	6	Nov., 1939
Paving entire project	Not under contract	0	Feb., 1940
Land-scaping	Not under contract	0	Mar., 1940

1300-FOOT TUNNEL

A unique feature of the work is a 1300-foot 4-lane tunnel being constructed by the open cut and backfill method. The material taken from the tunnel cut was used to overload a section of fill on marshy ground skirt-

ing the edge of Mountain Lake. The fill was built up nearly twenty feet above grade, resulting in displacement of the marsh mud until the highway fill now rests on firm foundation. The material thus stock piled as overload will later be used to back-

Governor Olson Accomplishes a Reduction in Toll Rates on San Francisco-Oakland Bridge

(Continued from page 2)

bridge in May was 47,352 continuing the definite trend of increased truck travel noticeable during the past year. May also showed an increase over the previous month in the amount of freight transported over the bridge with 59,345 tons as against 54,830 tons for April.

Revenues for the month of May amount to \$439,738.42. The report also revealed that a total of 153,424 vehicles traveled to Treasure Island via the bridge. Traffic from San Francisco to the island totaled 80,606 and from the east bay 72,818. May traffic totals and comparative figures are as follows:

	April, 1939	May, 1939	Total, 1939	Total since opening
Passenger Autos and Auto Trailers.....	767,327	761,650	3,608,572	21,316,244
Motorcycles and Tricars.....	3,467	3,759	15,906	102,805
Buses.....	8,270	8,929	40,872	288,506
Trucks and Truck Trailers.....	44,790	47,352	299,763	989,662
Toll vehicles.....	823,854	821,690	3,895,113	22,697,217
Passes.....	25,463	26,235	124,825	383,910
Total vehicles.....	849,317	847,925	4,019,938	23,081,127
Extra passengers.....	296,604	317,347	1,312,671	6,061,306
Freight tons.....	54,830	59,345	303,823	1,214,953



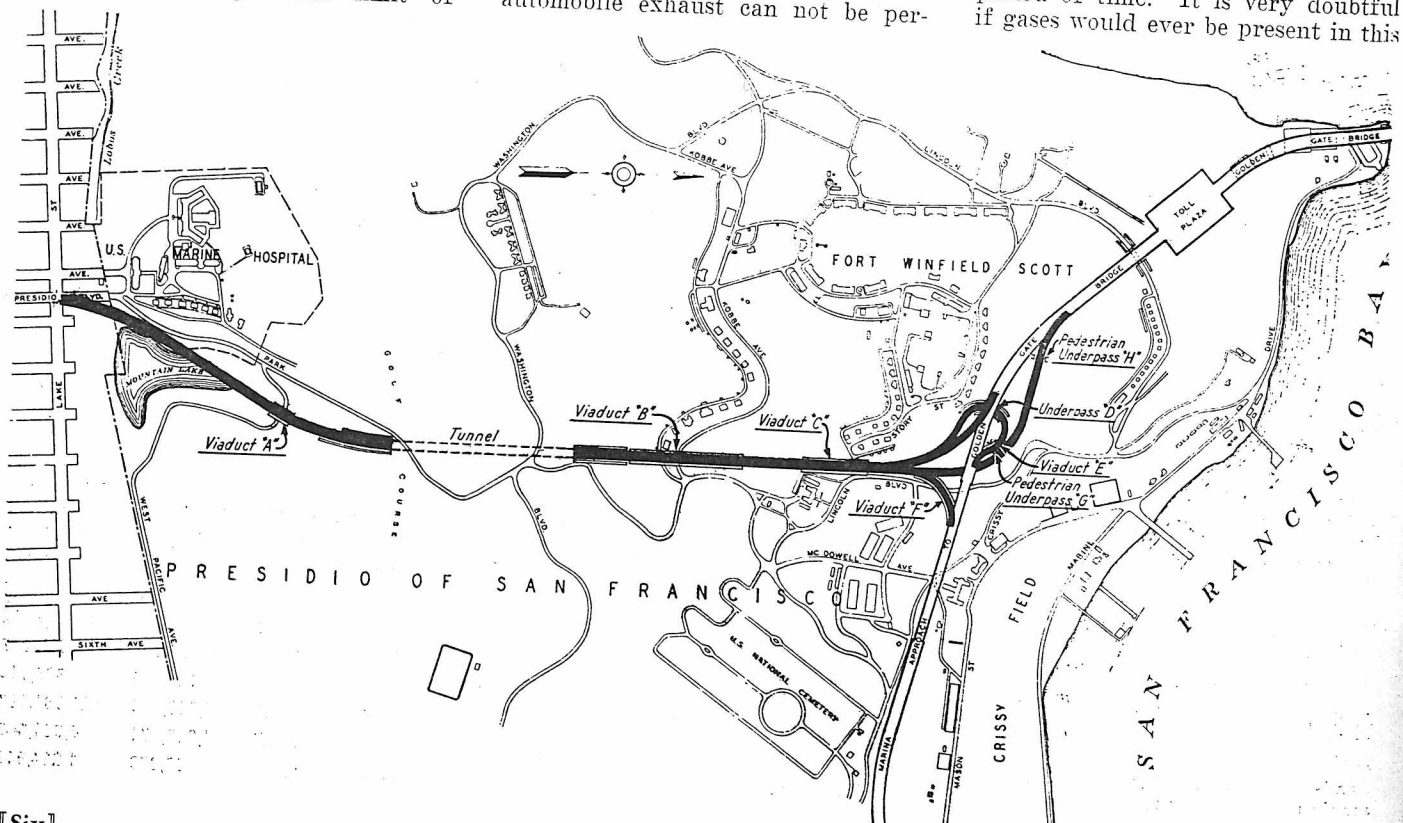
Pouring tunnel sidewall blocks. The tunnel, 1300 feet long, is being constructed by open cut and backfill method.

fill the tunnel and tunnel retaining walls.

The length of this tunnel, 1300 feet, approaches the practical limit of

length without requiring forced ventilation equipment. The odorless but noxious carbon monoxide gas from automobile exhaust can not be per-

mitted to exceed concentrations of 4 parts in 10,000 for any extended period of time. It is very doubtful if gases would ever be present in this



tunnel in dangerous concentrations, but ventilation is provided by a 24-foot by 24-foot shaft to the surface about midway of the length. If ever found necessary, exhaust fans will be placed in this shaft to provide forced ventilation by drawing fresh air in at both portals and exhausting it up the shaft.

NO DRAINAGE FROM HIGHWAY

Another unusual feature of the project is that no drainage from the highway can be permitted to flow onto the Presidio grounds or into any of the existing Presidio facilities.

This limitation necessitates construction of a master drain system which carries all drainage water to Mountain Lake at the south end of the project and to the San Francisco Bay at the north end. Across the various viaducts the drainage is carried in special pipes suspended beneath the deck.

Viaducts are of reinforced concrete construction. All are designed as rigid frame continuous girder types.

The roadway from the beginning of the project at Lake Street to the first viaduct, a distance of 1500 feet will have two 24-foot lanes separated by a center parting strip 6 feet wide. From there to the traffic distribution roadways the roadway, including viaducts, will have two 22-foot lanes separated by a center parting strip

A Good Samaritan

May 13th, 1939

Mt. Hermon,
California

The Division of Highways
Sacramento, California

My Dear Sirs:

Just a kindly word of commendation for the foreman of your San Lucas division who today found two elderly people in trouble with their car and unable to adjust themselves. He corrected the trouble and soon had them on their way, and flatly refused any compensation for the splendid help rendered. Therefore we desire again to thank a man whose name we do not have. Also the higher ups who select such men to service.

Sincerely yours,

MR. and MRS. A. R. TAYLOR
Mt. Hermon

18 inches wide. Except through the tunnel and across viaducts, shoulders 9 feet 6 inches wide will be provided.

The traffic distribution roadways including structures will have a road-

way width of 24 feet between curbs.

An interesting feature of the work is caring for golf course facilities near the tunnel cut. Two tees and one green were moved to temporary locations away from the work and a foot bridge for the golfers was constructed over the tunnel cut. These facilities must be returned to their original location after the tunnel backfill is completed.

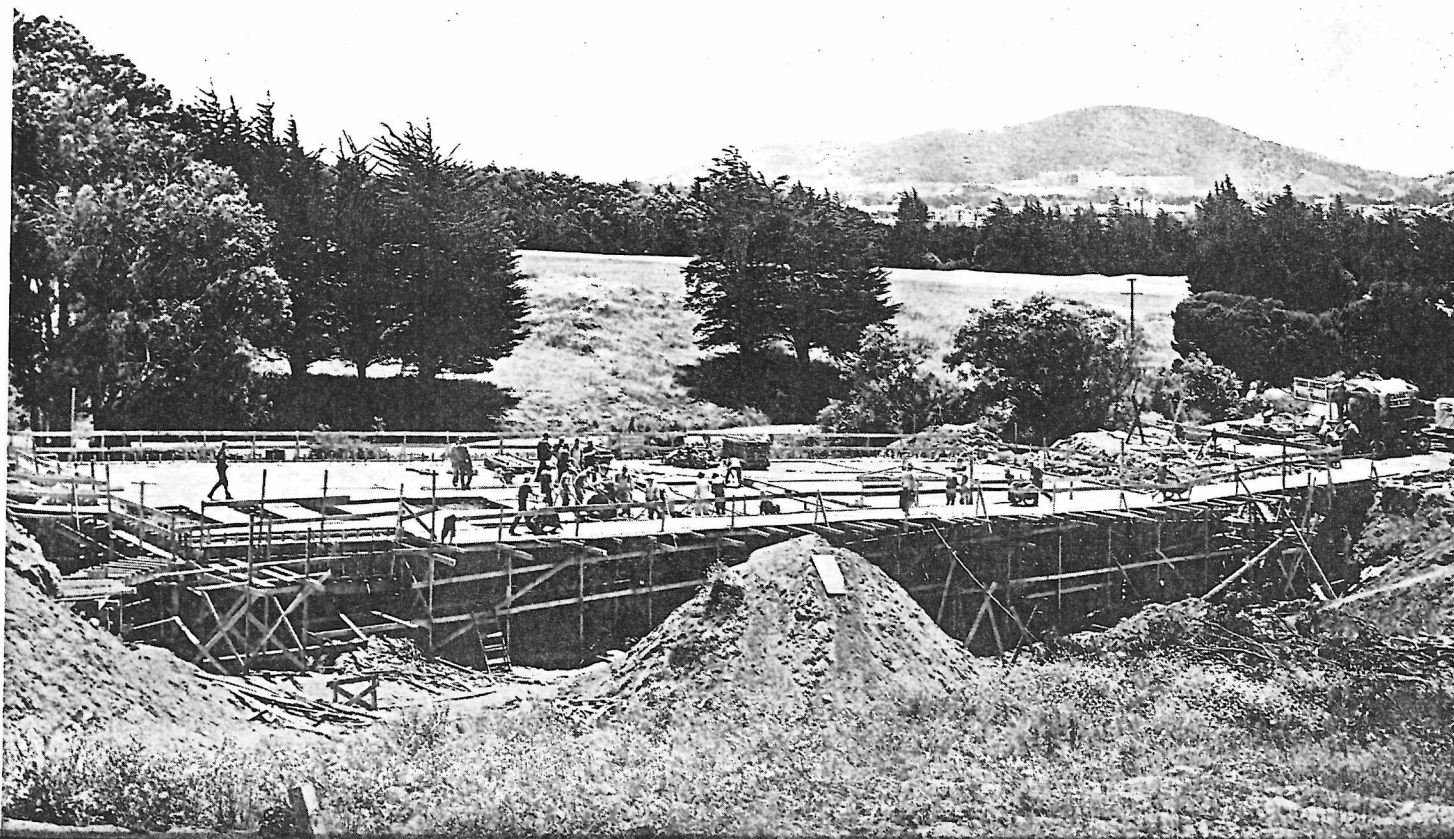
Progress on the work has been good. Grading work is nearly completed. Foundation work for all viaducts is nearly completed and superstructure construction is in progress. At the tunnel, footings and sidewalks are completed and pouring of the concrete tunnel arch is scheduled to start immediately. The arch will be poured by using steel form jumbos, traveling on rails. These form jumbos are now being erected in preparation for the first arch pour.

At present, about 275 men are regularly employed at the site of the work and it is expected this force will be increased as additional units of work are placed under contract.

Approximate quantities of major items and materials which will be used for the entire project are:

Roadway Excavation	310,000 cu. yds.
Concrete	40,000 cu. yds.
Reinforcing Steel	2,500 tons
Crusher Run Base	10,000 tons
Drainage Pipes	21,000 lineal feet

Pouring last section of the deck of Viaduct "A" which carries the approach highway over West Pacific arterial in the Presidio.



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California Public Works, Highways

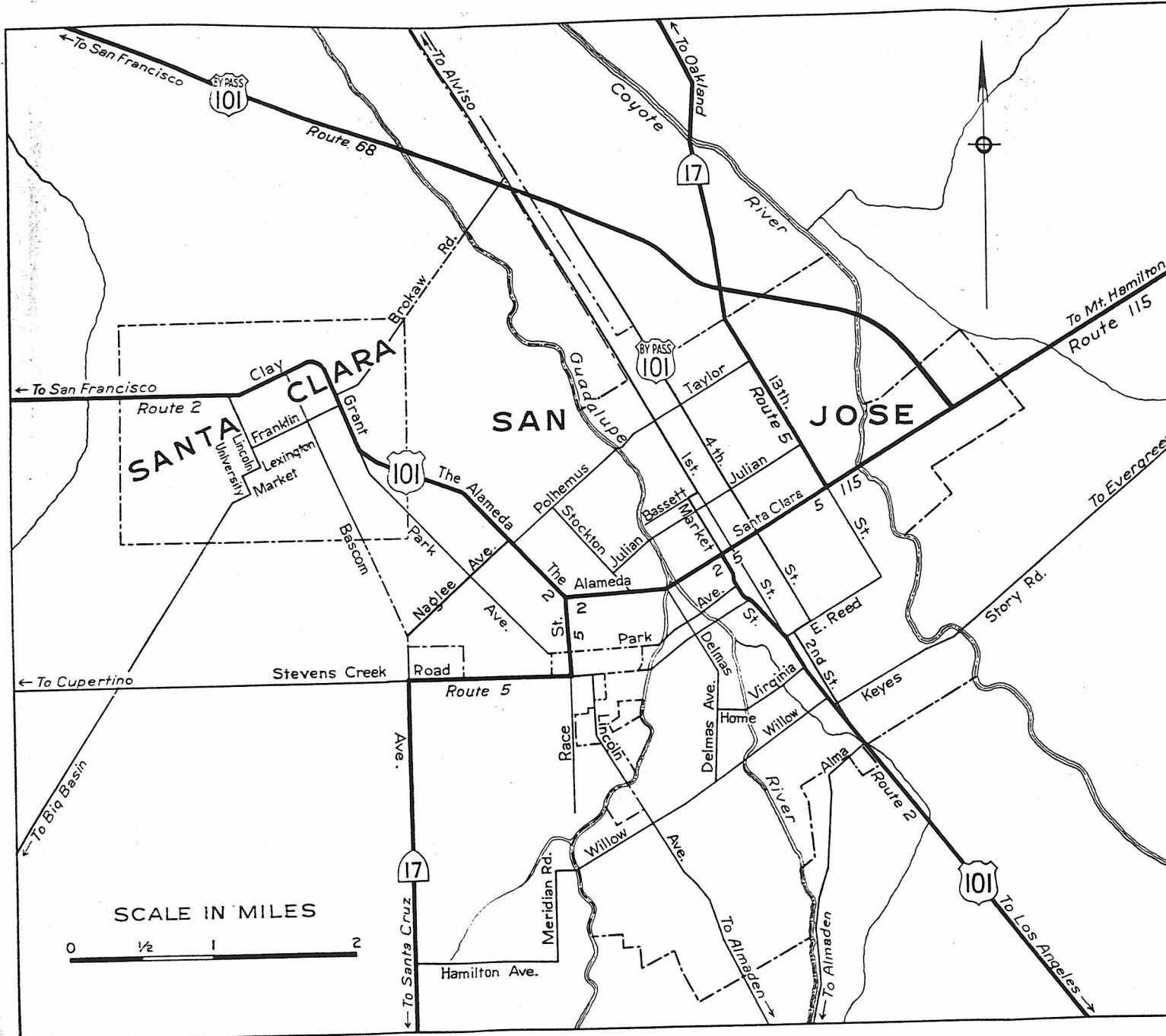
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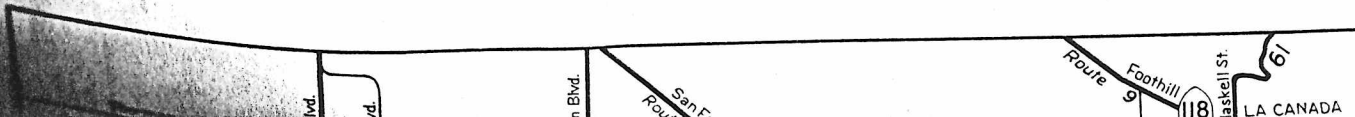
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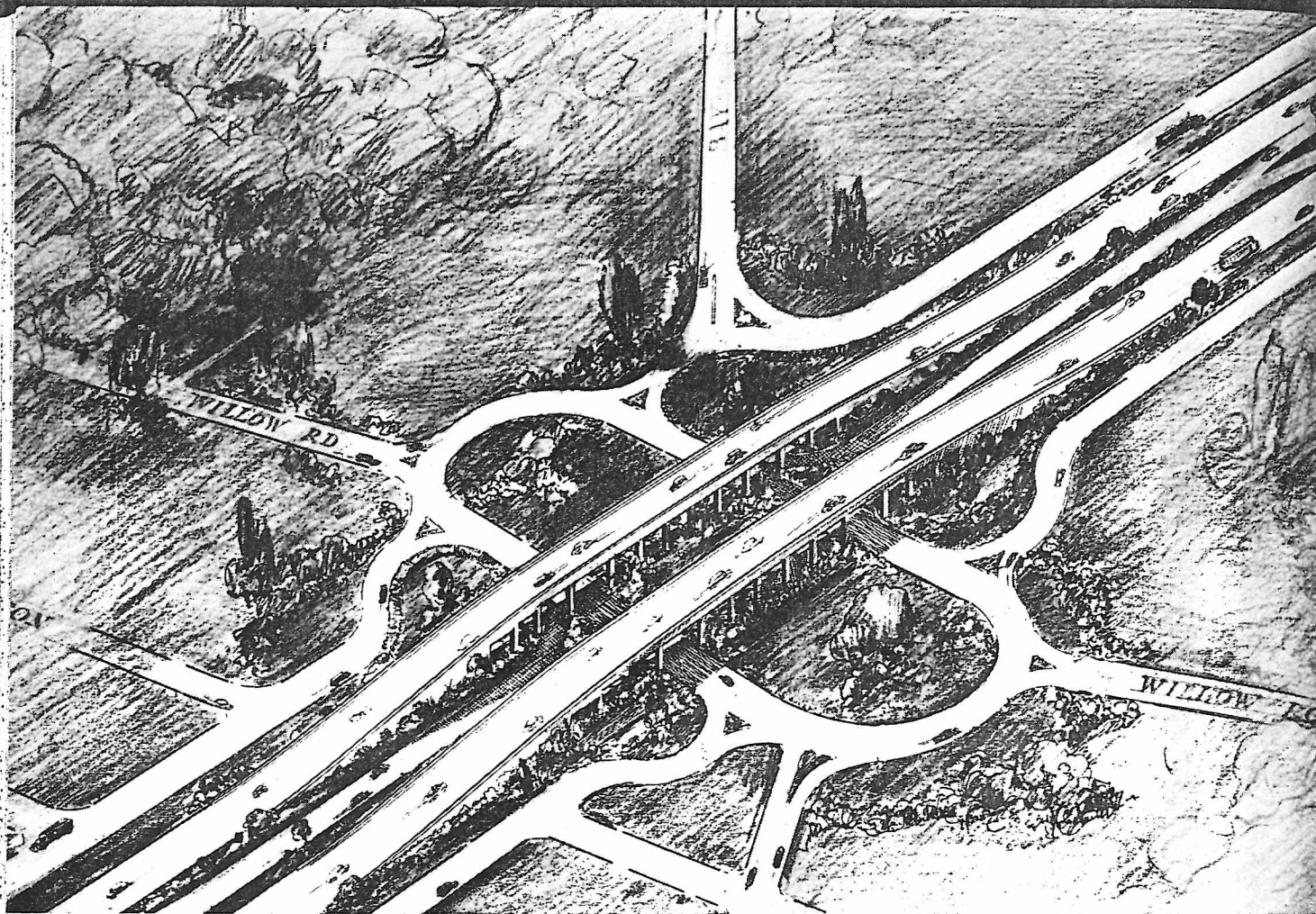
TUNNEL CONSTRUCTION BY OPEN CUT METHOD ON STATE
HIGHWAY APPROACH TO GOLDEN GATE BRIDGE
THROUGH PRESIDIO IN SAN FRANCISCO

SEPTEMBER
1939



1990





Engineers drawing of plan for carrying Bayshore through traffic on two separated overpasses at Willow Road intersection in Palo Alto with outside lanes for local traffic and safe access lanes to freeway.

Bayshore Freeway Plans Shown

By LAWRENCE BARRETT, Chairman Highway Commission

DUE TO the phenomenal growth of the San Francisco peninsula area, it is imperative that the State undertake as soon as possible the conversion, by stage construction, of the present Bayshore Highway between San Francisco and Palo Alto into a freeway, with six lanes divided by a median strip for high speed traffic and the construction of twenty-five overheads, underpasses, and major structures, which will eliminate all intersections on this route.

Director of Public Works Frank W. Clark presented a report covering every detail of the proposed project to the California Highway Commission

in session in San Mateo on July 26th.

The report was prepared by State Highway Engineer C. H. Purcell and Colonel Jno. H. Skeggs, District Engineer. Director Clark made the following statement relative to the State's plan of converting the Bayshore Highway into a freeway:

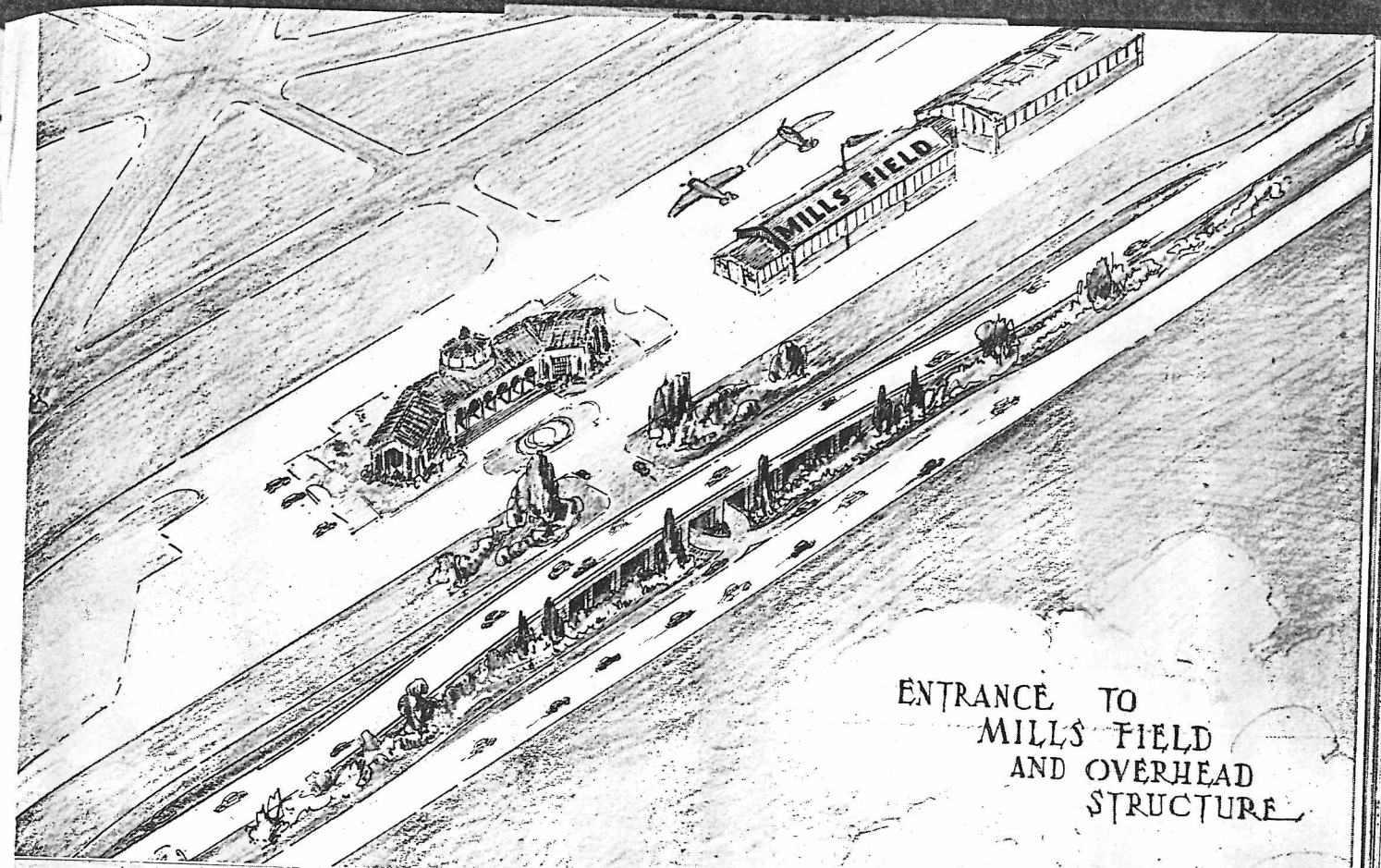
"In view of the increasing traffic congestion problems in our metropolitan areas, Governor Olson and the California Highway Commission are of the opinion that the logical solution of these problems in our largest cities is the construction of high-speed freeways such as the Arroyo Seco project now nearing completion between Los Angeles and Pasadena, and

this proposed freeway between San Francisco and Palo Alto.

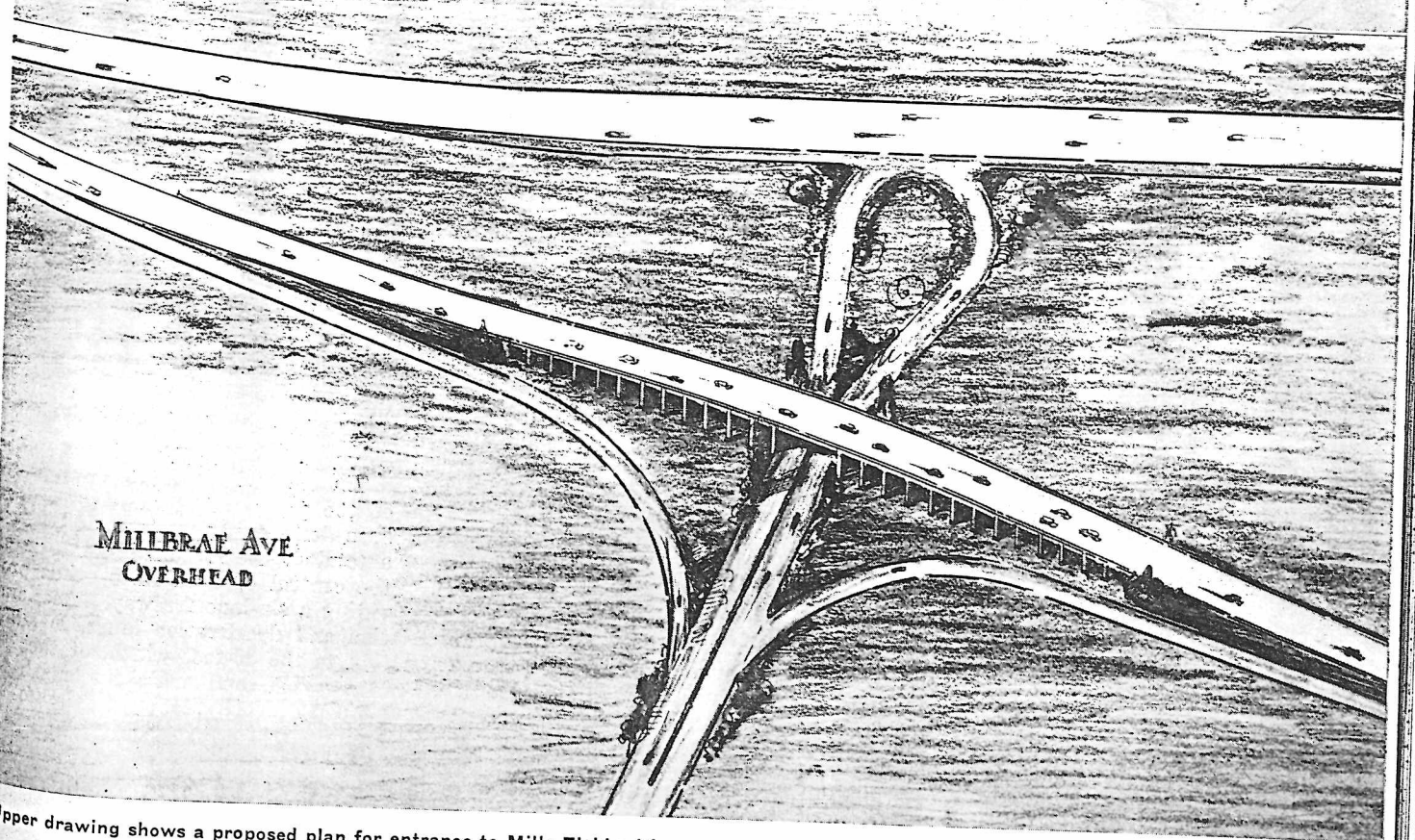
LONG RANGE PROGRAM

"Such undertakings involve the expenditure of large sums of highway funds, and necessarily must be built in sections under a long-range program. The present State administration is committed to a policy of assisting cities to solve their traffic congestion problems, and Governor Olson is greatly interested in having the Bayshore Freeway started as soon as moneys required may be provided for in the next biennial highway budget.

"The Arroyo Seco is the first free-



ENTRANCE TO
MILLS FIELD
AND OVERHEAD
STRUCTURE



MILLBRAE AVE
OVERHEAD

Upper drawing shows a proposed plan for entrance to Mills Field with one overpass structure in the separated freeway lanes. Below, Millbrae Avenue intersection showing existing highway separated by 40-foot division strip from new overhead with approach roads to both lanes.

way undertaken by the Highway Commission, and the Bayshore Freeway will be the first project of its kind in Northern California.

"In establishing the freeway principle on the Bayshore Highway the State will be able to conserve the full original investment in this route which is susceptible of expansion with a minimum of conflict with residential and property improvements."

State Highway Engineer Purcell's report pointed out that traffic from the San Francisco - Oakland Bay Bridge, from the Golden Gate Bridge, and the East Bay District, in addition to traffic from San Francisco, now pours onto the Bayshore Highway, which is inadequate to handle the ever-increasing traffic. In less than ten years Mr. Purcell believes that both the El Camino Real and the Bayshore Highway will be carrying capacity traffic.

TENTATIVE PLANS SUBMITTED

In his report to the Commission Director Clark submitted tentative plans and drawings for the contemplated freeway, extending from the vicinity of Third Street in San Francisco to the Embarcadero Road-Oregon Avenue intersection in East Palo Alto, a distance of some 27 miles. The first unit of the project will be from the South San Francisco Underpass to and including Broadway in Burlingame, at an approximate cost of \$2,300,000.

The Bayshore Highway, from the San Francisco City and County line through San Mateo County, was added to the State Highway System by legislative enactment in 1923 and construction of the first unit of the existing highway between South San Francisco and Burlingame, a distance of $5\frac{1}{2}$ miles, was started in September, 1924, and since that date one unit has been completed during each biennial period, until up to the present time the last section is ready for use by the motoring public.

"Over this sixteen-year period of construction," Director Clark said, "the daily traffic on this route has increased from nothing to a present volume of some 30,000 motor vehicles of all types. As a consequence, that portion of this highway between San Francisco and Palo Alto should be progressively expanded and modernized, not only to adequately handle present-day traffic, but to care for the traffic increase which will soon overtake the present improvement.

"The Bayshore Highway has de-



Director Clark hands proposed Bayshore Freeway report to Chairman Barrett.

veloped into one of the most important main trunk highways of our State for commercial vehicles and through traffic destined for the southerly sections of the State. Its proximity to the San Francisco Airport, at Mills Field, and Moffet Field at Sunnyvale, emphasizes its importance for national defense. It has assumed greatest importance, however, in serving to accommodate an ever-increasing volume of fast, or express commuter-type of traffic, between the focal business area of San Francisco and the residential urban areas on the peninsula."

Director Clark submitted to the Commission a report from State Highway Engineer Purcell, which revealed, that compared with the State-wide average of 1.4 accidents per million vehicle miles, the rate of the Bayshore Highway was 2.9, or slightly more than twice the general average. The report said that conversion of the Bayshore Highway into a freeway should eliminate or greatly reduce head-on, intersection, pedestrian, and "U"-turn accidents.

The Bayshore Highway throughout San Mateo County, compared with other four-lane highways in the State, ranks as one of the highest in accident rate per million vehicle miles traveled. During 1939 there were

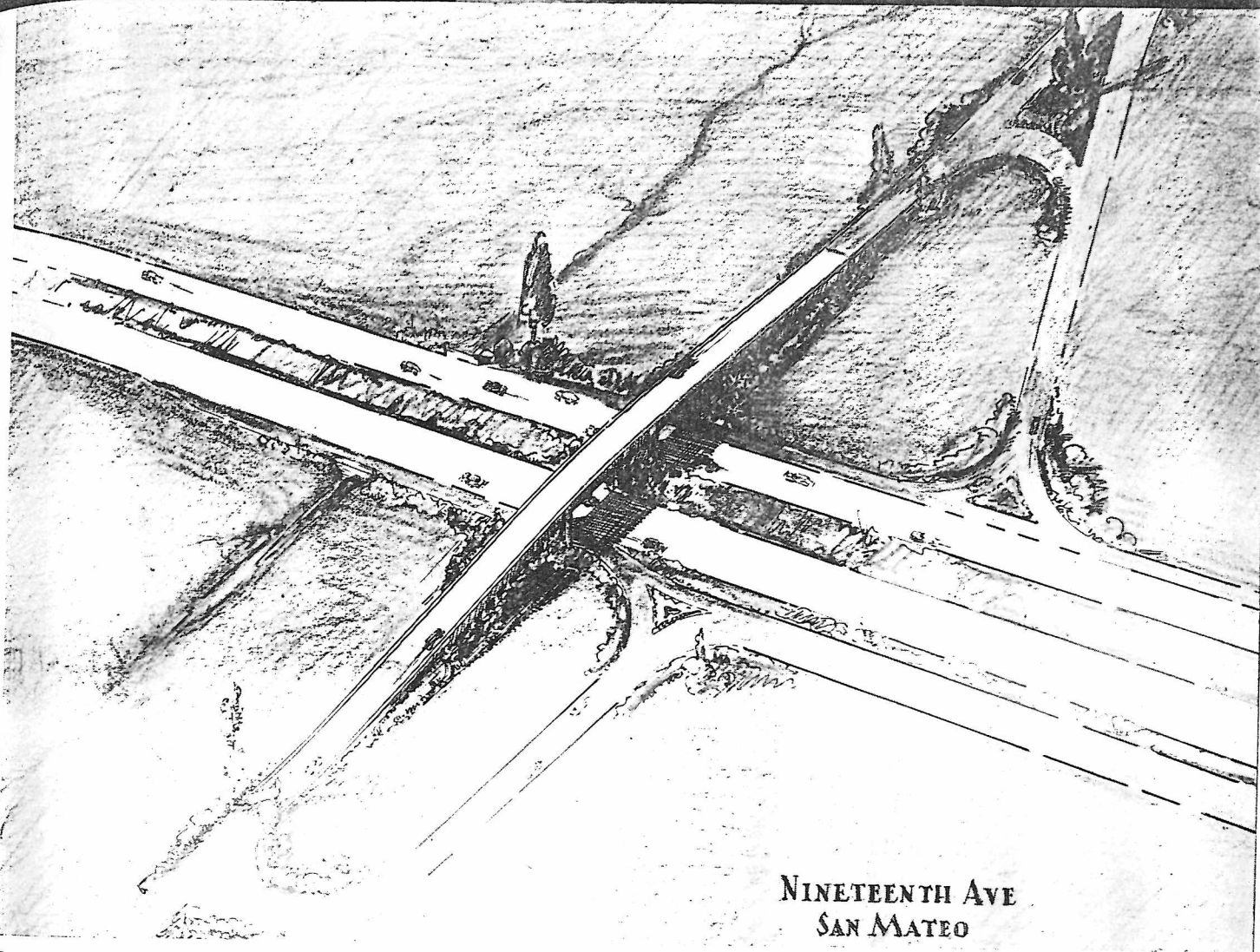
276 accidents on this section, involving 19 fatalities and 235 injuries. Using a conservative figure of \$5,000 per fatality, \$300 per injury, and \$50 per accident for property damage, it is apparent that there was an economic loss of \$179,300 during 1939 due to accidents on this stretch of highway.

ONLY FEASIBLE FREEWAY

The Peninsula Area in general, and San Mateo County in particular, must be considered as a part of greater San Francisco. Due to the topography, the number of main arterials serving this area is limited and the Bayshore Highway offers the only route lending its expansion into a freeway.

The freeway portion, or interlanes, of the proposed new highway have been designed 12-11-12 feet in width, a total of 35 feet on either side of the central division strip—thus providing a six-lane freeway. Acceleration and deceleration lanes, in addition to the 35-foot width, of the 11-foot width, and sufficient length to properly decelerate or accelerate to design speeds, have been provided.

The magnitude of this project in its entirety is such that it will require all funds which can be made available by the State, various incorporated cities and towns, and the



Proposed overpass at Nineteenth Avenue, San Mateo, crosses widely separated freeway lanes with curved approaches providing safe access to highway.

counties, in addition to such federal aid as may be obtained.

"In addition to financing the initial construction on portions in San Mateo County" said Mr. Clark, "some assistance from all public bodies interested may be necessary to produce the Bayshore Freeway as an accomplished project. It is hoped this result can be obtained by 1950 or sooner."

101 PER CENT INCREASE

In his report Highway Engineer Purcell said that the combined traffic on the Bayshore Highway and El Camino Real, serving the potential population area of the Peninsula in the period 1928 to 1939, has increased 44 per cent on Sundays and 101 per cent on Mondays.

The proposed freeway, 27 miles in length, starts with a grade separation at Third Street in San Francisco, proceeding with a new and direct freeway location to Sierra Point,

thence expanding on the east side through San Francisco, thence by revisions on both sides to south of Broadway, Burlingame, from which point on to the Embarcadero Intersection south of Palo Alto, widening on the east side of the existing alignment throughout, is recommended by Mr. Purcell.

Ultimately it is planned to plant trees and shrubs along the entire length of the dividing strip.

Moving pictures showing the broadly divided freeways or parkways of the metropolitan area of New York and on Long Island were exhibited to the Commission, showing the great advances in development of such arterials in the East.

The Commission heard delegations from the City and County of San Francisco; San Mateo; California State Automobile Association; San Francisco Chamber of Commerce and San Francisco Supervisors, all en-

dorsing the proposed freeway expansion of the Bayshore Highway.

In behalf of the Highway Commission I can give assurance that under the present administration there will be set up in the coming budget, sufficient funds to start this program on the Bayshore Highway that will result in a highway of which we will all be proud. In the construction of this improvement consideration will be given to a freeway.

Realizing the importance of this highway we will set up a sum for the construction of a portion of the project looking forward to the full completion of it in the future.

While the cost of the improvement in its entirety will be tremendous, the saving of life and property and the relief of dangerous traffic conditions will fully justify any expenditure required to make the Bayshore Highway a modern, safe route. As a

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MOTORWAYS NECESSARY

Chaotic conditions arising from the growing demoralization of transportation within urban centers is not only increasing the hazards to life and property but it is also causing great inefficiency and economic losses by retarding the growth and development of our cities. In the interest of public safety, of efficiency, of economy and of progress, adequate motorway facilities within and through urban areas must be immediately anticipated. To accomplish this the State and cities must cooperate in the construction of such public thoroughfares.

In California the Department of Public Works through its Division of Highways will do its share in meeting the State's urban traffic needs. Between Los Angeles and Pasadena construction of arroyo Seco Parkway is now nearing completion. Only yesterday, a three and seven-tenths mile section of this freeway—from Avenue 40 in Los Angeles to Orange Grove Avenue in Pasadena—was opened to traffic. This six mile project with its 28 bridges and grade separations, in the building of which the State had the cooperation of the cities of Los Angeles, Pasadena, and the Federal Government, will cost about twelve million dollars.

In another part of the city the first section of the Cahuenga Freeway has just been opened to public traffic. This also is a cooperative project with the State, City, and Federal Government participating.

BAYSHORE FREEWAY PLANS

In the north we now have under way a survey for the changing of 27 miles of the Bay Shore Highway between San Francisco and Palo Alto into a modern motor freeway. The plan for this arterial is to provide two 35-foot freeways with 21 grade separations and no surface intersections.

I am greatly concerned over the increasing traffic congestion in the western sections of Los Angeles. This week I ordered a comparative survey of traffic on the west side with especial attention to be paid to Wilshire Boulevard, Olympic Boulevard and Santa Monica Boulevard, and traffic flowing from the San Fernando Valley and Hollywood areas. The State of California will lend all possible assistance to the

Bay Bridge Traffic for July Reaches All-time High of 1,533,929 Vehicles

JULY traffic on the San Francisco-Oakland Bay Bridge continued the acceleration displayed in May and June and reached an all-time high for a one-month period with 1,533,929 vehicles.

The increase over July of 1939 was 440,427 vehicles, or 40.3 per cent. This increased travel, however, was not accompanied by an increase in revenue which dropped \$46,634. This reflects the present average toll of 27.4 cents compared with 42.7 cents one year ago. The average toll in July of last year was 56 per cent greater than it is today.

The record traffic for the month was accompanied by some unusually

heavy traffic on weekends, showing a Sunday average of 57,769 with a high of 59,828 on July 21.

A year ago traffic to Treasure Island totaled 242,191 cars compared with 234,527 during July of this year. The slight reduction is attributed to the popularity of bus service to the exposition rather than to a decrease in patronage. However, this decreased travel to Treasure Island does indicate an even greater increase of normal traffic using the bridge than the 40.3 per cent cited above.

July traffic on the San Francisco-Oakland Bay Bridge and comparative figures are:

	July 1940	July 1939	June 1940	Total Since Opening
Passenger autos and auto trailers -----	1,413,564	1,011,424	1,258,403	34,731,883
Motorcycles and tricars -----	4,588	4,376	4,681	155,743
Buses -----	26,547	17,327	25,528	582,702
Trucks and truck trailers -----	68,421	44,850	57,174	1,685,143
Others -----	20,809	15,525	19,155	590,741
Total vehicles -----	1,533,929	1,093,502	1,364,941	37,746,212

City of Los Angeles in solving the problem of this critical traffic situation. The State is hopeful that its immediate and future highway planning in Los Angeles, San Francisco, Oakland, and our other larger cities, will be so developed as to materially assist them in handling the ever increasing flow of traffic into their metropolitan areas.

During this brief talk I have tried to bring to your personal attention only a few of the many important and definite departmental steps, which are being taken by your present State government under the able leadership of Governor Olson, and which I sincerely trust will be accepted by you as citizens and taxpayers of this State as an indication of our desire and determination to efficiently and faithfully serve you.

It happened at the spring training camp of a major league baseball club.

Gatekeeper (to the manager)—The umpire for today's game is at the gate with two friends. Shall I pass them in?

Manager (gasping)—An umpire with two friends? Sure!

Bayshore Freeway Plan Urged

(Continued from page 9)

resident of San Mateo County, with my business interests in San Francisco. I have had occasion, over a period of years to travel the Bayshore Highway at least twice a day, and I know the hazards to motorists that exist there today.

I think the launching of this project will be hailed as one of the outstanding achievements of the present state administration.

Oildale Bridge Prospects

Director of Public Works Frank W. Clark has notified Senator James Hollister, Gaviota, and Supervisor Ralph Lavin of Bakersfield that the Division of Highways anticipates being in a position to start construction of the new Oildale Bridge across Kern River, and the realignment of the highway through Oildale sometime during the latter part of November.

The Bridge Department of the Division of Highways, which is preparing plans and specifications for the proposed Oildale Bridge, expects this project will be ready for advertising of bids about October 1.

Engineering Details And Route Of Proposed Bayshore Freeway

By C. H. PURCELL, State Highway Engineer

IN sixteen years since the opening of the first section of the Bayshore Highway in 1924, traffic has increased from nothing to 30,000 vehicles per day, while traffic on El Camino Real, the original and only other peninsula highway, has remained nearly constant.

The Bayshore is an important trunk for through state and commercial traffic, and a key-route from the standpoint of national defense, but is most important in serving fast commuter-type traffic from the suburban peninsula area, which is a part of greater San Francisco. This commuter and week-day local traffic is most closely correlated to vehicle registrations of San Mateo County alone. Sunday traffic is affected more by the combined vehicle registrations of San Francisco, San Mateo and Santa Clara counties.

The combined traffic on State Highway Route 2 (El Camino Real) and 68 (Bayshore highway) serving the potential populated area of the peninsula in the period 1928-1939 has increased 44 per cent on Sundays and 100 per cent on Mondays. Forecasts of 15-hour daily traffic on the Bayshore Highway at the South San Francisco under-pass for 1950 is 43,000 for Sunday and 34,000 for Monday, with present facilities having a maximum capacity of 32,000 vehicles. For 1965 the traffic forecast is 50,000 and 41,000 respectively for Sundays and Mondays.

With expanded Bayshore facilities, with induced traffic, 16-hour daily Sunday volume is forecast at 46,000 for 1950 and 60,000 for 1965. Monday traffic forecast is 38,000 by 1950 and 55,000 by 1965. Mass transportation by bus, on the proposed freeway prior to 1965 should level off peak hour travel increasing generally accepted highway traffic 20 to 25 per cent week-day travel. Sunday travel during evening peak-hour by 1965 should flow uniformly on the freeway, but at modified speeds.

Capitalized reducible accidents on the Bayshore Highway in San Mateo County would justify an investment of one and one-half million dollars from that standpoint alone. The Bayshore is the logical and only route which can be expanded to freeway design due to topography and property improvements. All of the present capital investment can be conserved for public use.

A start should be made now toward expanding the Bayshore Highway to a six-lane freeway design. The first unit should be between the South San Francisco under-pass and Peninsula Avenue, near the cities of Burlingame and San Mateo.

The proposed route, 27 miles in length, starts with a grade separation at 3d Street in San Francisco, proceeding with a new and freeway location at Sierra Point, thence expanding on the east side through South San Francisco, thence by revisions on both sides to south of Broadway, Burlingame, from which point on to the Embarcadero intersection south of Palo Alto, widening on the east side of the existing alignment throughout is recommended.

Full cooperation of all incorporated cities, the county, the State and Federal government, will be required to start and prosecute this major San Francisco metropolitan highway project to successful conclusion in time to realize and insure the full economic benefits which it can bestow upon the community and the State.

The recommendations of the Division of Highways are as follows:

1. The reconstruction of the Bayshore to consist of a six-lane highway of the freeway type.

2. The highway to be declared a freeway from Third Street in San Francisco to Oregon-Embarcadero Road in Santa Clara County.

3. The 6.6 mile section from immediately south of South San Francisco Underpass, to and including Peninsula Avenue, Burlingame, to be started and proceed by stages as the first unit. Surveys and design to proceed so right-of-way negotiations may start and this project may be advertised for construction as soon as funds are made available.

4. An allotment of funds for acquisition of right-of-way on the preceding section, and acquiring key parcels for protection where required between San Francisco and San Mateo.

5. Surveys and design to be started in San Francisco, toward acquisition of rights-of-way, by agreement, with $\frac{1}{4}$ ¢ Gas Tax funds for State Highways in San Francisco.

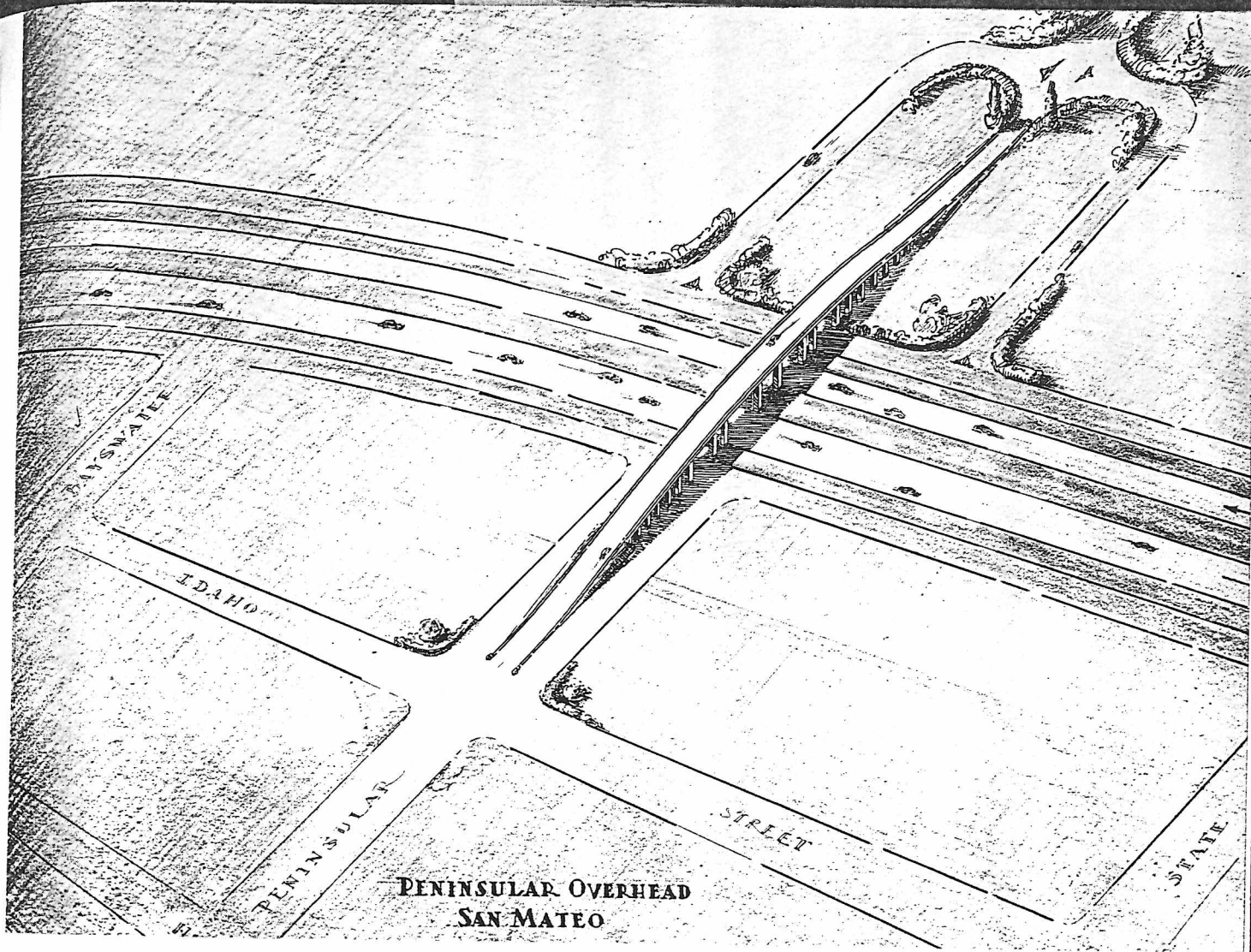
6. Request cooperation of cities and county in protection of existing set-backs, establishment of additional set-backs where required, and financial assistance in acquiring key parcels if necessary to avoid building and other improvements, where required on the entire project.

The route of the proposed freeway is as follows:

a. Third Street in San Francisco to Sierra Point.

About one-third of both the week-end and week-day travel on the Bayshore Highway south of Third Street in San Francisco enters or leaves at Third Street. The ratio of interfering traffic to through traffic movement is 30 per cent, the highest of any individual intersection on the entire project. Traffic signals, combined with street car traffic crossing the Bayshore at an acute angle, make this a point of serious delay to the main Bayshore travel.

A relocation of this route, leaving the existing road for the use of local travel, one direct relocation southerly from Third Street and across the shallow bay waters to Sierra Point, appears to be the most feasible.



Proposed intersection plan for Peninsula Avenue, San Mateo. Separated freeway lanes, overpass structure, with service and access lanes for local traffic.

ible and economical solution. The present Bayshore grade line in the vicinity of Third Street is rolling, with a peak at Third Street, making it feasible to construct an underpass as a part of this project, which would actually start at Salinas Street for proper connection, and to make provision for complete traffic separation and access facilities to Third Street.

6-MILE SECTION

This improved alignment would have a maximum 4 per cent grade, and would represent a saving in distance of .37 mile, equivalent to more than \$150,000 saving in vehicle operating costs per year, which, capitalized at 7 per cent, would justify a capital investment of some \$2,200,000 from this standpoint alone.

Access to the freeway is planned for Blenken Street, and at the southerly end of the section south of Sierra Point. Two bridges have been planned for the Bay section, and another

other over the main line of the Southern Pacific at Sierra Point.

Length of this section is 3.8 miles.

b. Sierra Point through South San Francisco.

The present highway of 40-foot paved width in a 125-ft. width of right-of-way, has been widened to curbs 100 feet wide through the city portion. This widened portion has, however, been surfaced only with a light armor coat, in contrast to the 40 feet of main heavy concrete pavement. Traffic is becoming so heavy that during peak hours it is commonly observed traveling one, and sometimes two lanes on each side of the concrete pavement, for this section.

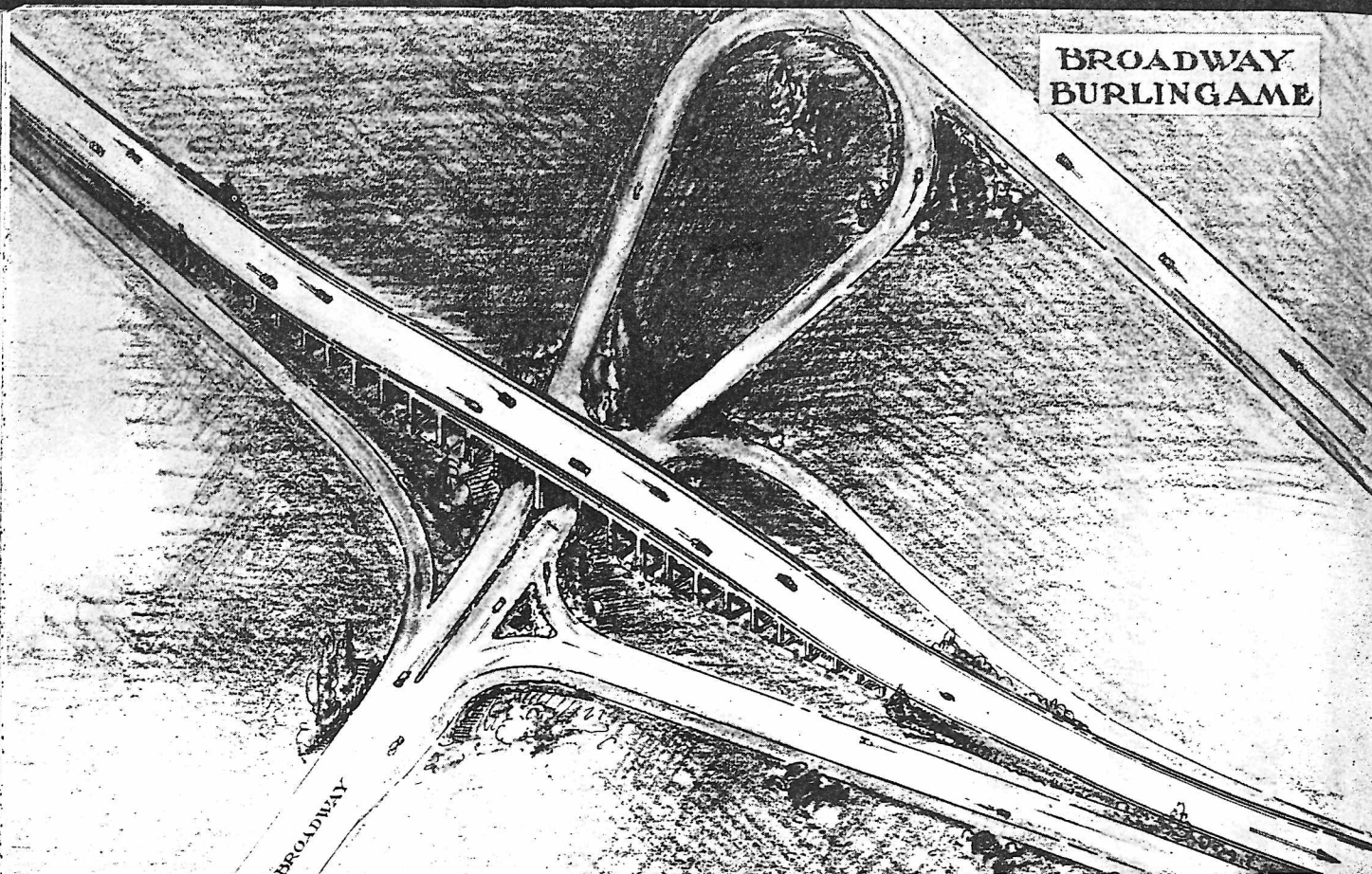
Grand Avenue, with traffic signals, and a 21 per cent conflict of interfering traffic to through traffic movement, most of which is cross-traffic, is another point of appreciable delay during peak hours of

traffic, in particular, but to all traffic, in general.

The present underpass under the Southern Pacific Railroad has a 1,000-ft. radius curve, in contrast to the approximate 3,000-ft. minimum radius planned for the freeway design. It has a superelevation of only one-tenth of present standard for high-speed traffic, and an existing vertical clearance of 1.1 feet under present desirable minimum. It therefore presents a barrier for consideration in widening the existing pavement on the present alignment, in view of the grade separation which must be provided for Grand Avenue. Grand Avenue serves the large industrial point jutting eastward from South San Francisco, and is a through street which can not be ignored.

Our studies indicate that the greatest economic return and value can be obtained by widening the present highway on the easterly side, over-

BROADWAY BURLINGAME



One-way freeway lanes are widely separated in this sketch for the Broadway intersection at Burlingame. Cars entering or leaving the freeway would use the big loop curves providing safe connections with either lane.

passing Grand Avenue and the Southern Pacific mainline tracks with one structure east of the present underpass, reserving the latter for local entrance and exit to and from the town of South San Francisco.

As with the section preceding, a narrow, or 6-ft. minimum width of division strip between the inner freeway lanes, has been planned for this section. The existing highway pavement would continue as the outer lane serving local traffic for this section.

Access to and from the freeway is planned at the northerly city limits, at Grand Avenue and vicinity, and south of the present South City underpass, with appropriate access and separation structures.

This section is 1.8 miles in length.

c. South San Francisco Underpass to Peninsula Avenue in Burlingame.

Due to the character of the terrain this section traverses, the location of Mills Field and immediate plans for its development and others in Burlingame and San Mateo, to conserve the value of the investment in the present highway, there appears to be only one proper and logical solution for the reconstruc-

tion of this section of highway.

After due consideration of all factors involved, it is recommended this section be developed by stages to an ultimate "Freeway" design, and become the initial unit of construction.

The freeway is planned to consist of the use of the present roadway for one-way traffic, a new three-lane roadway to be constructed and separated from the present pavement by means of a 40-ft. minimum width of division strip. The division strip, with the initial construction of the new roadway, will provide immediate relief at the intersections made with San Bruno Avenue, entrance to Mills Field, Millbrae Road, Broadway, Burlingame, and Peninsula Avenue, where ultimate grade separations are planned.

This section of highway has a very high accident rate, and of these accidents almost 60 per cent are of the type which will be eliminated by the construction of dual roadways with protection at intersections. The first stage, including the channelization of these intersections, will facilitate flow of traffic and provide safety features which are lacking on

the highway at the present time, although maximum freeway principle can not be realized either from traffic flow or safety until the grade separations are built.

The alignment of the new roadway is planned to parallel the westerly side of the present pavement to near Millbrae Road, thence diverging and continuing on direct course to the present connections with Broadway, Burlingame. Due to imminent development and increased future values of property on the westerly side of the Bayshore south of Broadway, Burlingame, and to provide for a very attractive and efficient entrance to Broadway, a transition is made at this point and the new roadway will be provided for by widening on the easterly side from this point to Embarcadero Avenue in Palo Alto.

Due to the existing development between Broadway, Burlingame, and Peninsula Avenue, outer lanes are planned on the westerly side of the present roadway to provide for local traffic movements between these two points.

The improvement of this section, of 6.6 miles in length, will promote

and accelerate the development of the whole Peninsula area to a greater immediate extent than could be expected from the improvement of any other section as the first unit.

Cost of right of way depends upon negotiations for large holdings by the City and County of San Francisco.

An allotment of \$600,000 is recommended to acquire rights of way to this section and to acquire key parcels for protection at other locations where required between San Francisco and San Mateo.

d. Peninsula Avenue, Burlingame, to Main Street, Redwood City.

The present highway of this section traverses low delta land and salt marsh to Redwood City. The existing alignment is satisfactory, and ex-

Ultimate grade separation structures are proposed at Third Street—San Mateo, Nineteenth Avenue—San Mateo, Ralston Avenue—Belmont, Holly Avenue—San Carlos, and Jefferson Street—Redwood City.

Present traffic conflict using these connecting roads and related trends indicated that the first separation structures should be provided for at Third St. in San Mateo and at the entrance to Redwood City, with other separations to follow as the development of the various areas requires.

Pending increased traffic volumes on these intersecting roads, provision can be readily made to channelize the dividing strip at these points and in so doing, reduce the potential accident hazard to a minimum.

The construction of outer lanes will

be necessary from Peninsula Avenue to approximately Tenth Street in San Mateo, to serve local traffic in the adjacent residential and business areas.

This section is 8.7 miles in length.

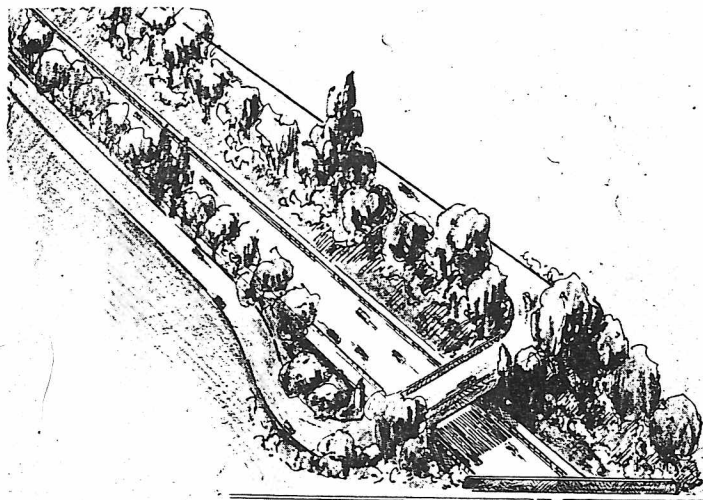
e. Main Street, Redwood City, to Embarcadero Road south of Palo Alto.

This section of existing highway, 6.2 miles in length, traverses agricultural lands and existing or potential urban developments. The alignment, grade and roadway pavement is satisfactory and is readily adaptable to the same type of improvement as proposed for the preceding section.

In general, it is proposed to use the existing roadway for southbound traffic and to widen the right of way on the easterly side and construct a new 3-lane roadway for northbound traffic, separated from the existing traveled way by a 40-foot width of dividing strip. This width of dividing strip may be varied through developed areas where outer lanes are required and where complete facilities may be completed with the initial stage of construction.

Future grade separations are tentatively proposed at Chestnut Street, Redwood City; Fifth Avenue, opposite Fair Oaks, each side of Dumbarton Subway, Willow Road and University Avenue, East Palo Alto, and Embar-

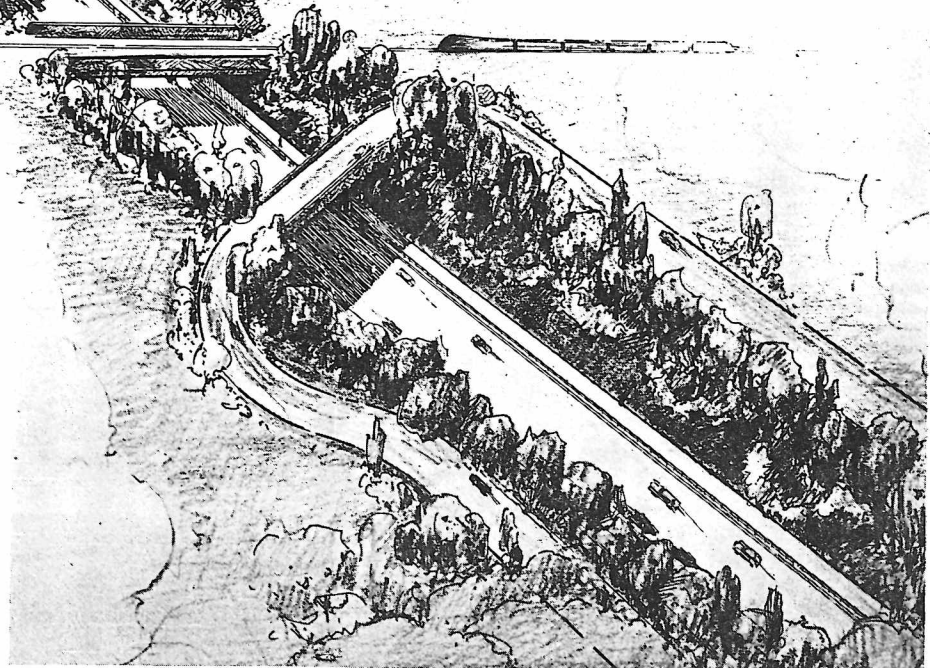
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DUMBARTON UNDERPASS
SM. 68 D. STA. 164

cept for consolidation settlement over some marsh areas, the roadbed is in good condition throughout. It is proposed to utilize the existing roadbed for future southbound traffic and to construct a new 3-lane roadway for northbound traffic on the easterly side of the present highway, separated from the existing road by a 40-ft. division strip, to permit stage development of the ultimate freeway design.

Existing property improvements and potential future development predominate on the westerly side, being the reason for widening of right of way on the bay side of the existing highway.



Grade separations tentatively proposed at Dumbarton Subway.

sen & Westbrook, Sacramento, \$48,953; A. Teichert & Son, Inc., Sacramento, \$54,425; N. M. Ball Sons, Berkeley, \$55,110; Marshall S. Hanrahan, Redwood City, \$63,960. Contract awarded to Jones & King, Hayward, \$47,976.

SHASTA COUNTY—Between Redding Underpass and Hill Street in Redding, about 1.1 miles in length to be graded and surfaced with Portland cement concrete pavement and with plant-mix surfacing on crusher run base. District II, Route 3, Sections A, Rdg. N. M. Ball Sons, Berkeley, \$110,116; Hemstreet and Bell, Marysville, \$122,750; Marshall S. Hanrahan, Redwood City, \$127,426; Jones and King, Hayward, \$129,217; A. Teichert and Son, Inc., Sacramento, \$131,036. Contract awarded to Fredericksen and Westbrook, Sacramento, \$104,643.75.

SHASTA COUNTY—Sacramento River Bridge north of Redding to be repaired by constructing reinforced concrete abutment on steel piles and (1) structural steel and concrete span 28' long. District II, Route 3, Section B. A. Frederick Anderson, Oakland, \$12,875; Fred J. Maurer & Son, Eureka, \$18,688. Contract awarded to E. E. Smith, Berkeley, \$11,783.

SOLANO COUNTY—Bridge across Sacramento River at Rio Vista, to be repaired. District X, Route 53, Section C. M. A. Jenkins, Sacramento, \$13,883; Thomas Const. Co., Burbank, \$13,573; F. Kaus, Stockton, \$14,173. Contract awarded to Lee J. Immel, Berkeley, \$11,576.30.

SOLANO-YOLO COUNTIES—At points between 0.5 and 3.5 miles south of Davis, 6 R. C. Bridges to be constructed. District X, Route 6, Section A. E. Campbell Construction Co., Sacramento, \$127,087; Engineer's Limited, Sacramento, \$128,529; Fred Maurer & Son, Eureka, \$129,621; Heafey-Moore Co. & Frederickson & Watson Construction Co., Oakland, \$129,967; M. J. B. Construction Co. and F. Kaus, Stockton, \$130,790; Harry J. Oser, San Francisco, \$133,003; Holdener Construction Company, Sacramento, \$136,442; E. E. Smith, Berkeley, \$140,846; C. W. Caletti & Company, San Rafael, \$141,601; J. S. Metzger & Son, Los Angeles, \$149,592. Contract awarded to E. T. Lesure, Oakland, \$117,396.90.

SONOMA COUNTY—Two miles west of Guerneville, two reinforced concrete slab sidehill viaducts on steel piles, having lengths of 112' and 252' to be constructed. District IV, Route 104, Section A. Harold Smith, St. Helena, \$25,953; Trewitt-Shields and Fisher, Fresno, \$26,273; C. W. Caletti and Company, San Rafael, \$30,025. Contract awarded to Carlton C. Gildersleeve, Berkeley, \$24,378.

SONOMA AND NAPA COUNTIES—Near Wyatts Corner, and between Yenni Ranch and 0.6 mile east of Napa County line, about 2.7 miles in length, about 1.1 miles to be graded and entire project to be surfaced with plant-mix surfacing and seal coat applied. District IV, Routes 8, 104, various sections. Harold Smith, St. Helena, \$72,090; N. M. Ball Sons, Berkeley, \$75,147; Chas. L. Harney, San Francisco, \$87,805; A. Teichert & Son, Inc., Sacramento, \$89,357; J. L. Conner & Sons, Point Arena, \$89,894; A. G. Raisch, San Francisco, \$97,128. Contract awarded to E. A. Forde, San Anselmo, \$68,757.83.

TRINITY COUNTY—Across Trinity River near Douglas City, repairing 2 125' steel deck truss spans. District II, Route 20, Section A. Trewitt-Shields & Fisher, Fresno, \$20,650; E. E. Smith, Eureka, \$24,330; A. Frederick Anderson, Oakland, \$27,891; A. Soda & Son, Oakland, \$30,725; Mercer Frazer Company, Eureka, \$33,224. Contract awarded to Fred J. Maurer & Son, Eureka, \$19,900.

VENTURA COUNTY—Between Los Angeles County line and Timber School, about 3.0 miles in length to be graded and plant-

Route of Proposed Bayshore Freeway

(Continued from page 13)

caderno Road south of Palo Alto. The construction of complete grade separation facilities at these various locations will depend upon the location and extent of improvements in this area.

The proposed future separation at Chestnut Street in Redwood City will eliminate the only open railroad crossing remaining on this route, and will also provide crossing facilities for traffic to the industrial area east of the highway.

The area traversed by this section is potential future residential, industrial and urban areas, and although at present undeveloped (except through East Palo Alto), is rapidly being subdivided into residential areas.

At the present time it would appear that the first separations should be considered at junction with Willow Road and University Avenue in Palo Alto, to be followed by structures at Chestnut Street in Redwood City and Embarcadero Road south of Palo Alto. As in previous cases the first stage of divided highway construction without grade separation will greatly increase the safety factor for travel on this highway.

The area through East Palo Alto presents a particularly difficult problem due to the many business establishments now existing on either side of the present road, and will require considerable study for final design.

CARS USE MOST GAS IN AUGUST

A recent report indicates that in 1939, as in 1938, the greatest consumption of gasoline was in August. In that month motorists and others bought an average of 70,514,000 gallons of gasoline a day. Better cars, better roads, and better gasoline apparently have leveled out the use of automobiles and the gasoline demand curve appreciably, however, for even in the lowest month, January, the average daily consumption totaled 49,959,000 gallons. Greatest monthly increase in consumption last year was in June, which recorded a 10.3 per cent gain over June, 1938.

mix surface and Portland cement concrete pavement to be placed. District VII, Route 2, Section A. Basich Bros., Torrance, \$119,321; J. E. Haddock, Ltd., Pasadena, \$124,447; Macc Construction Co., Clearwater, \$125,739; Oswald Bros., Los Angeles, \$126,547; Dimmitt & Taylor, Los Angeles, \$133,004; Sander Pearson, Santa Monica, \$136,340. Contract awarded to Griffith Co., Los Angeles, \$116,193.60.

Keaton Speaker at Opening of Oregon Highway

DEPUTY Director of Public Works, Morgan Keaton, was the official representative of Governor Culbert L. Olson and one of the speakers at the opening of the Willamette Highway in Oregon on July 30th, when the new highway was dedicated with ceremonies at the east entrance to the new highway tunnel at Salt Creek Falls.

The Willamette Highway, which is Oregon Highway 58, begins at a junction with the Pacific Highway about 7 miles south of Eugene and runs in a southeasterly direction to connect with Highway 97, 10 miles south of Crescent. The route then follows Highway 97 to Klamath Falls into California and connects again with Pacific Highway at Weed.

It is claimed that the mileage will be shortened at least 16 miles and the driving time four hours, between Portland and San Francisco.

Meyers Grade Relocation Opened

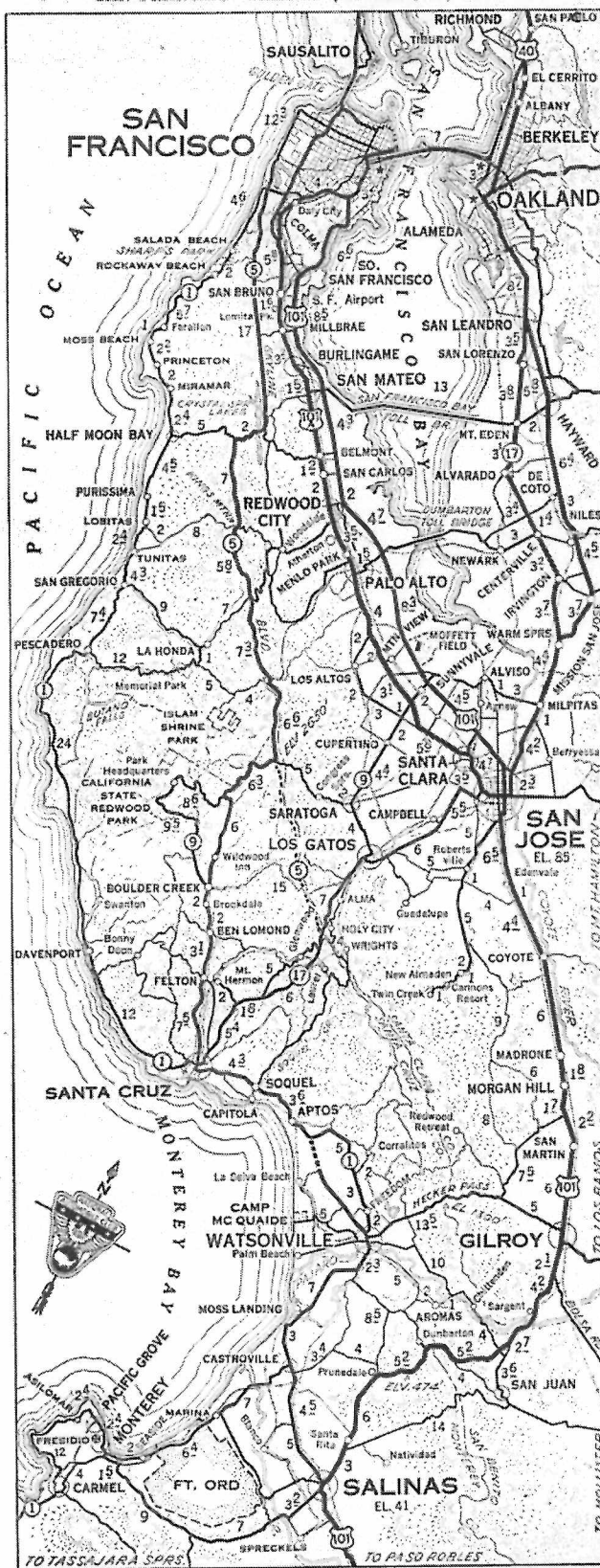
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rama of the Lake Tahoe basin. The transition is made over a sweeping summit curve, widened and safeguarded.

The descent that follows is on a roadway where width, curvature, grade and sense of security are in marked contrast to the former road. The new road will facilitate maintenance, especially in providing reasonably safe conditions when snow removal is required to keep the route open. Similar road standards will apply when the entire grade can be reconstructed to Meyers.

The Public Road Administration officials in charge of the project are: Dr. L. I. Hewes, chief of Western Region; C. H. Sweetser, District Engineer; Levant Brown, Senior Highway Engineer, in charge of Forest and Park roads construction; E. C. Brown, Senior Highway Engineer, as Supervising Engineer, and M. M. Flint, Resident Engineer.

SAN FRANCISCO—SALINAS (via San Jose) 109 M.



OAKLAND—SALINAS 101 M.

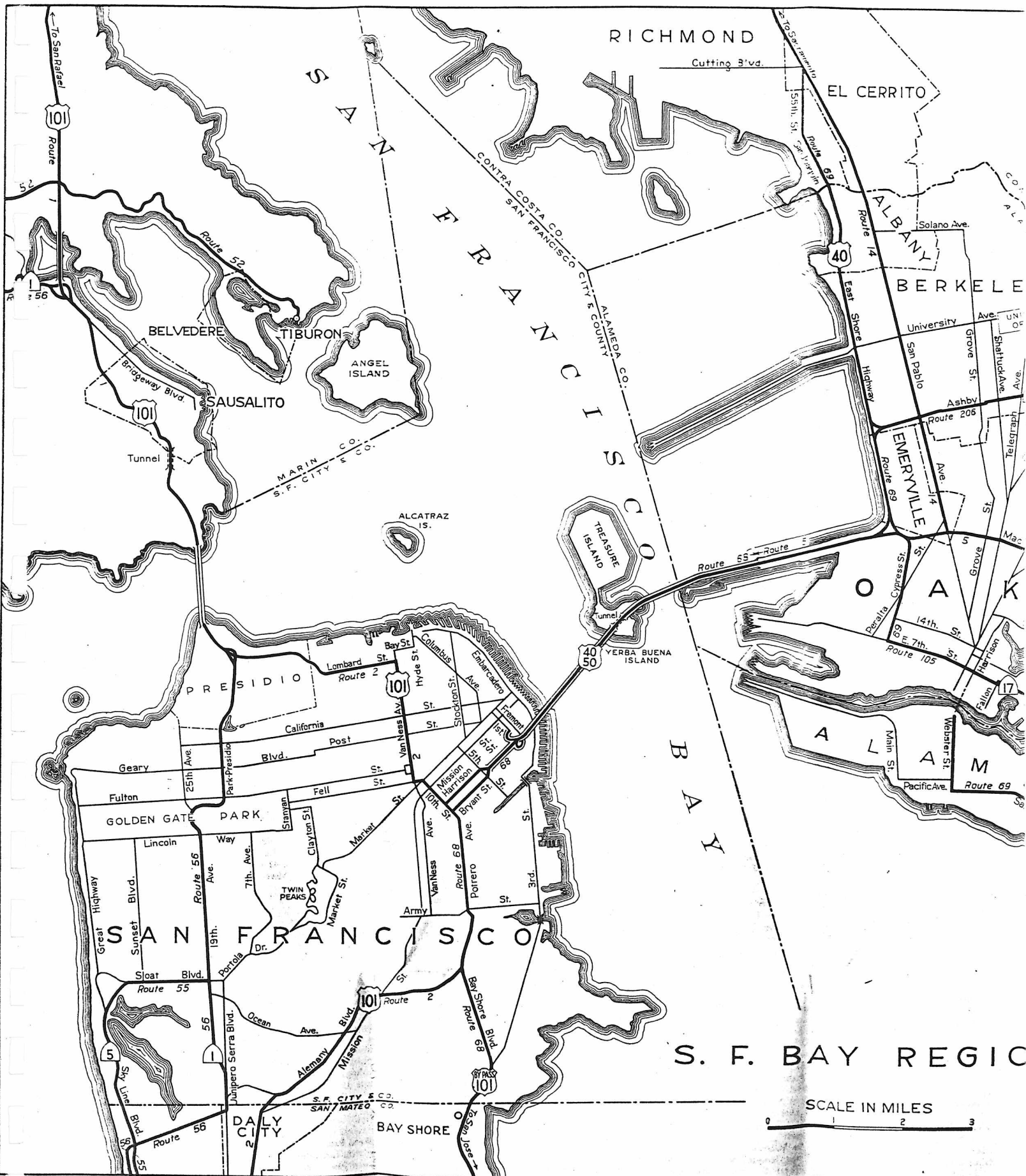
SAN FRANCISCO—SALINAS (via Santa Cruz) 122 M.

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This is a detailed map of the San Francisco Bay Area, showing major cities, highways, and geographical features. The map includes labels for counties such as Contra Costa, Alameda, and Santa Clara, and cities like San Francisco, Oakland, and San Jose. It also shows the San Francisco Bay, San Francisco Bay Bridge, and various highways like I-5, I-805, and I-680. A scale bar at the bottom left indicates distances in miles and kilometers.

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Jul - Aug 1943

Widening of U. S. 101 Eliminates Traffic Bottleneck in San Mateo County

By G. A. WILDMAN, Resident Engineer

UNDER a recently completed contract, which called for widening as well as resurfacing of the old pavement, one of the last serious bottlenecks on El Camino Real (U. S. 101) in the County of San Mateo, has been eliminated.

The contract,* 3.2 miles in length, covers that portion of El Camino Real between Charter Street, in Redwood City, on the north, and San Francisquito Creek, the county line of San Mateo and Santa Clara counties on the south, and passes through the town of Atherton and the city of Menlo Park.

Under previous contracts let over a period of several years the old highway had been widened and resurfaced both

north and south of the recently completed section.

Under one contract let in 1930, San Francisquito Creek Bridge was widened and the highway was reconstructed to a width of 40 feet with 7-foot shoulders south of the bridge in Santa Clara County.

On the north, under a more recent contract through Redwood City, the traveled way was reconstructed to a width of 70 feet with 7-foot shoulders, giving three 11-foot traffic lanes each side of a 4-foot division, making an over-all width of roadway of 84 feet.

The same general plan of construction on the contract just finished was followed as in the case of the Redwood City project, except that in general the over-all width of the finished roadway is 88 feet, providing 7-foot shoulders

der areas with two 12-foot and one 11-foot traffic lanes each side of a 4-foot division strip.

The exceptions to the above were on sections where curbed islands were provided, with a maximum width of 28 feet for channelization; also through a portion of the city of Menlo Park, where the over-all width of the traveled way, including shoulder or parking area, was reduced to 84 feet, leaving 8-foot sidewalk areas.

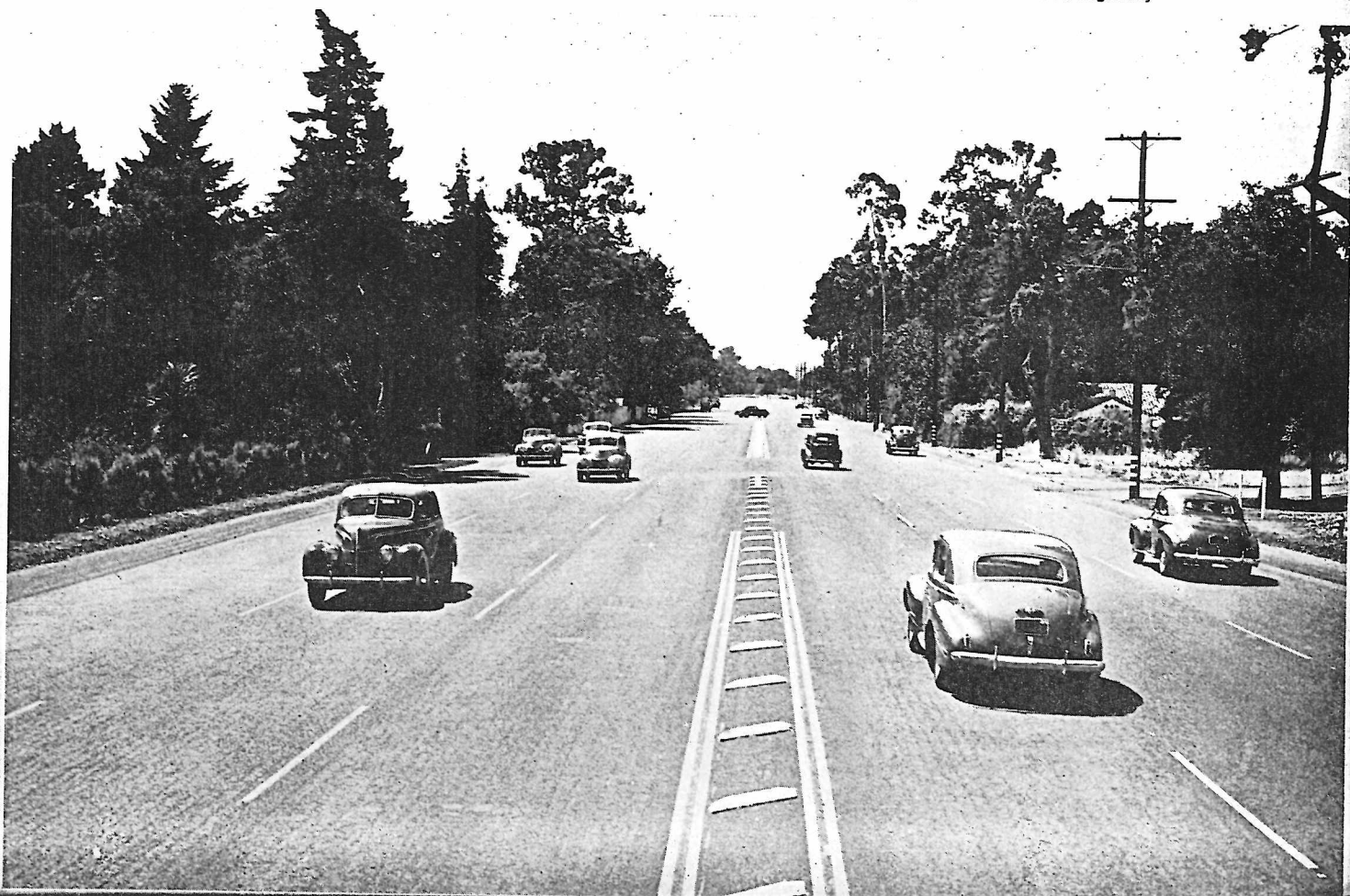
The history of the original construction and reconstruction of this portion of El Camino Real, obtained from various sources, is as follows:

Previous to 1912 or 1913 the traveled way consisted of a graveled roadbed, maintained during the dry seasons of the year by frequent sprinkling with

(Continued on page 12)

* This contract was awarded October 29, 1941, before Federal restrictions were placed on highway construction.

Typical view of widened section of U. S. 101 near Atherton providing a 6-lane divided highway





Top, improved section of U. S. 101 showing channelized division strip approaching Atherton. Below, widened avenue through Menlo Park

Widening U. S. 101 Eliminates Bottleneck

(Continued from page 8)

water wagons to keep the dust down, and worked with horse-drawn blades and drags to keep the roadway in a more or less smooth condition. During the wet season the roadway was maintained by keeping the holes filled with additional gravel and occasionally bladed or dragged, thus maintaining a suitable roadbed.

FIRST PAVING IN 1913

The first construction involving any paving was done in 1913, and provided a traveled way 20 feet wide of 1½-inch asphalt concrete pavement on a 5-inch macadam base. The traveled way was widened to 30 feet in 1925.

The roadway thus provided gave satisfactory service for many years, but due to increased traffic, heavy hauling, and the widening of the highway at each end, the volume of traffic fed to this section has been so great that serious congestion resulted.

Under the recent reconstruction, additional right of way had to be provided; this was in the main acquired along the westerly side of the old right of way and varied in widths from 26 feet, at the beginning of the project, to 55 feet in the vicinity of the island areas provided for channelization.

The acquisition of new right of way was a big job in itself and presented several difficult problems. In the city of Menlo Park several large buildings, including a reinforced concrete theater, had to be moved or remodeled, and one large two-story brick building with a full basement was completely demolished and the basement back-filled.

EARTHQUAKE EFFECTS SHOWN

This building had been erected previous to the earthquake of 1906 and had apparently withstood the quake without any damage, yet when the wreckers started to tear down the walls it was evident that the earthquake had loosened the brick in the mortar as they were removed without any difficulty and came out very clean.

Between Station 557 and the beginning of the project at Redwood City—a distance of 12,590 feet—there is only one intersecting waterway. This is at Atherton Creek, a distance of 4,116 feet from the summit. Southward

towards the end of the project there is a sag in the grade, the low point being at Station 590, elevation 58.54 feet and rising within a distance of 1,000 feet to an elevation of 72.52 feet, the top of the bridge deck at San Francisquito Creek.

STORM DRAIN INSTALLED

The flow line of San Francisquito Creek is at an approximate elevation of 46 feet, or only 12½ feet lower than the elevation of the highway at the low point of the sag. To drain this low sag and the street intersections on the westerly side of the highway in the business district of Menlo Park, a reinforced concrete pipe storm drain was placed starting at Santa Cruz Avenue, and running southward to empty into San Francisquito Creek, a distance of 4,200 feet. The diameter of the pipe varied from 15 inches at the beginning to 30 inches at the outlet.

LITTLE SHORING NEEDED

Very little shoring was necessary to support the walls of the trench, as the material excavated was of such a nature that it would stand nearly vertical, but as a precaution the contractor sloped the cut banks quite heavily and installed intermittent shoring during the progress of the excavation through the heavy cut sections.

Backfilling immediately around and over the pipe was done by hand. The material was placed in layers, jetting was permitted due to its sandy nature, but final compaction of each lift was done with a caterpillar tractor and sheepsfoot tamper. A caterpillar with bulldozer kept the backfill leveled up ahead of the tamping.

The roadway was widened each side of the old 30-foot asphalt concrete pavement, but mainly on the westerly side. New construction consisted of the removal of approximately 39,500 cubic yards of roadway excavation, the placing of 70,000 tons of imported borrow, and 43,000 tons of asphaltic concrete.

ASPHALTIC CONCRETE SURFACING

The imported borrow was placed to form a base 1 foot thick under 6 inches of asphaltic concrete on all widened

areas. The thickness of the asphaltic concrete surfacing over the old 30-foot pavement varied, but the new grade was maintained at an elevation that would provide a minimum of 2 inches of new surface over the old. The shoulders, or parking strip areas, were surfaced with plant-mix, except through Menlo Park where concrete curb and gutters were placed. Asphaltic concrete or portland cement concrete surfacing was placed on the shoulder areas adjacent to the new curb and gutters.

The contract was awarded to the Union Paving Company of San Francisco on October 29, 1941, and approved on November 19, 1941. Actual work was started on December 2, 1941. Due mainly to the outbreak of war, the contractor was unable to obtain labor, materials and supplies as readily as was anticipated, and the job was not completed until June 15, 1943. C. L. Corson was general superintendent for the contractor, and A. W. Jagow was job superintendent.

All work was done under the direction of the Division of Highways and under the general supervision of District Engineer Jno. H. Skeggs of District IV, San Francisco. Resident Engineer H. S. Payson was in direct charge of the work preceding his death on December 25, 1942. The work was completed under the supervision of G. A. Wildman as Acting Resident Engineer.

Trucks Hauling Livestock

Tonnage of livestock hauled from farms to market via truck in 1942 again set an all-time record, according to reports forwarded to the Automobile Club of Southern California. Trucks delivered 62.8 per cent of cattle, hog and sheep tonnage, and surveyors estimate that it would have taken 830,000 railroad carloads to transport this volume.

Young Man: "I think two can live as cheaply as one."

Future Father-in-Law: "You can't edge into my family on that theory, young man. I'm willing to keep supporting my daughter, but you'll have to pay board."

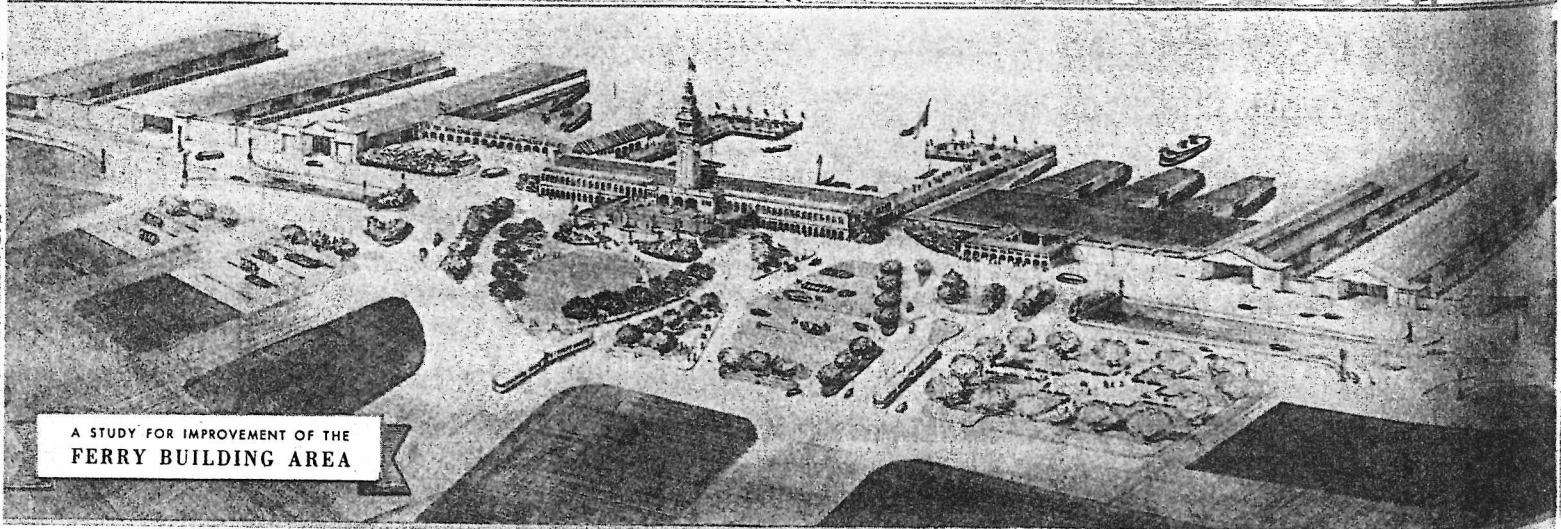
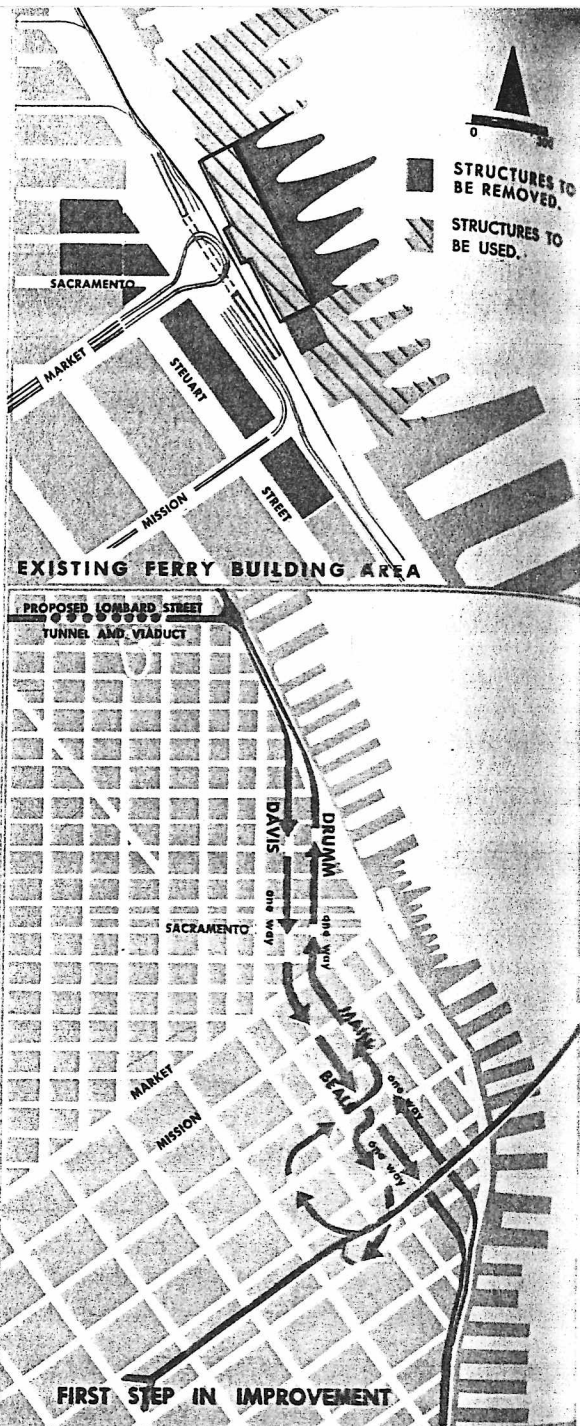
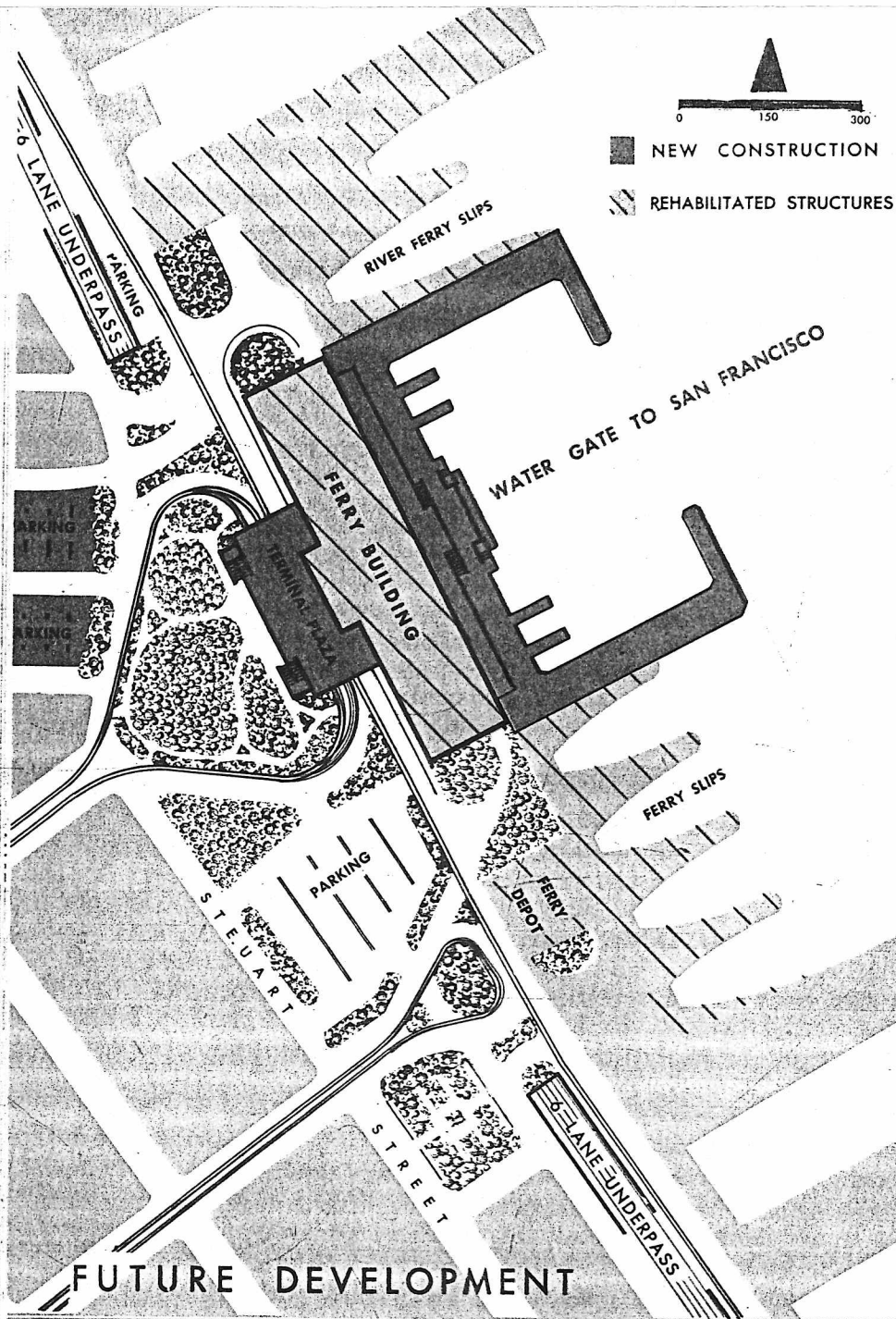
SHORELINE DEVELOPMENT

A Portion of the
MASTER PLAN OF SAN FRANCISCO

(PRELIMINARY REPORT)

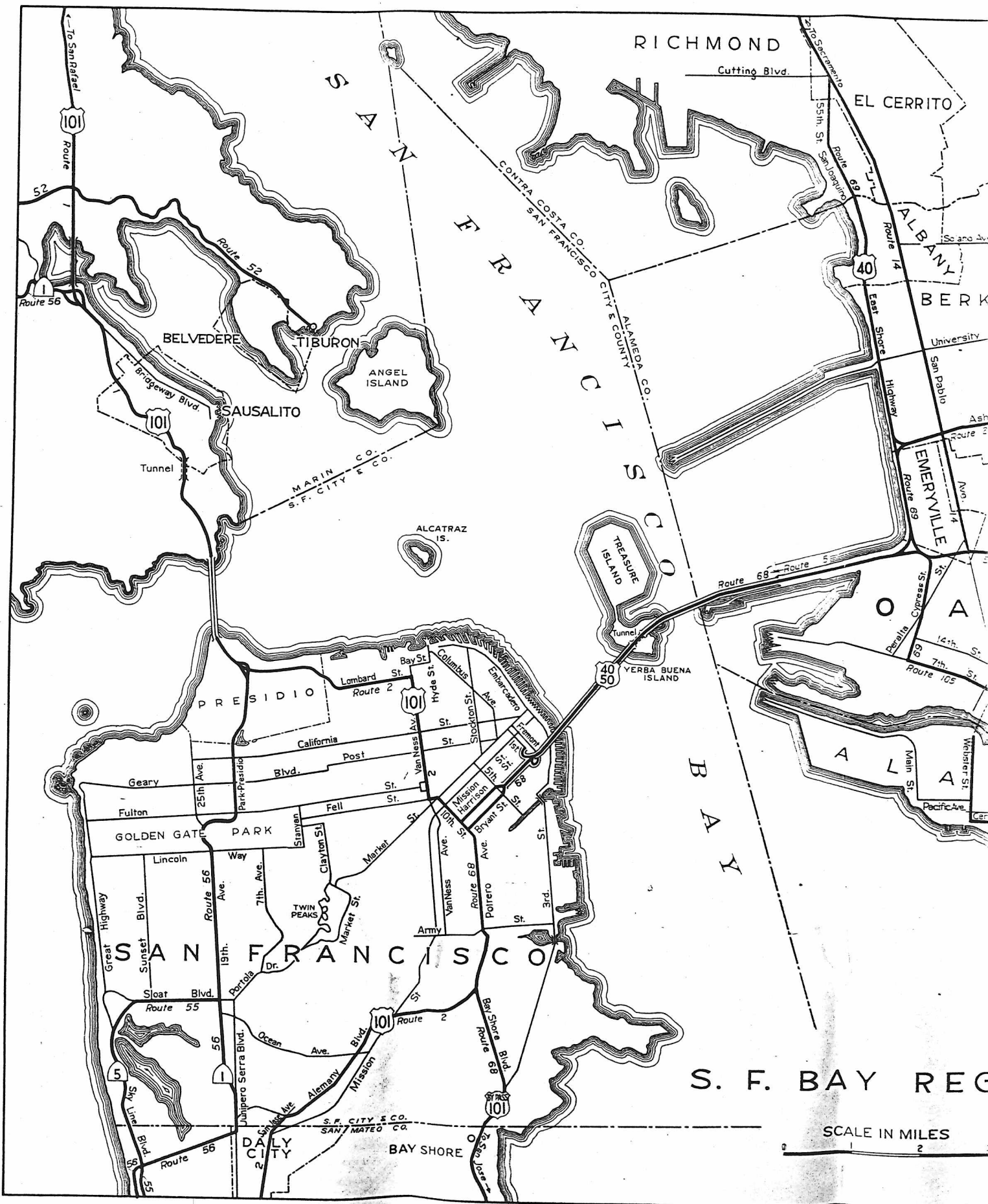
SAN FRANCISCO CITY PLANNING COMMISSION

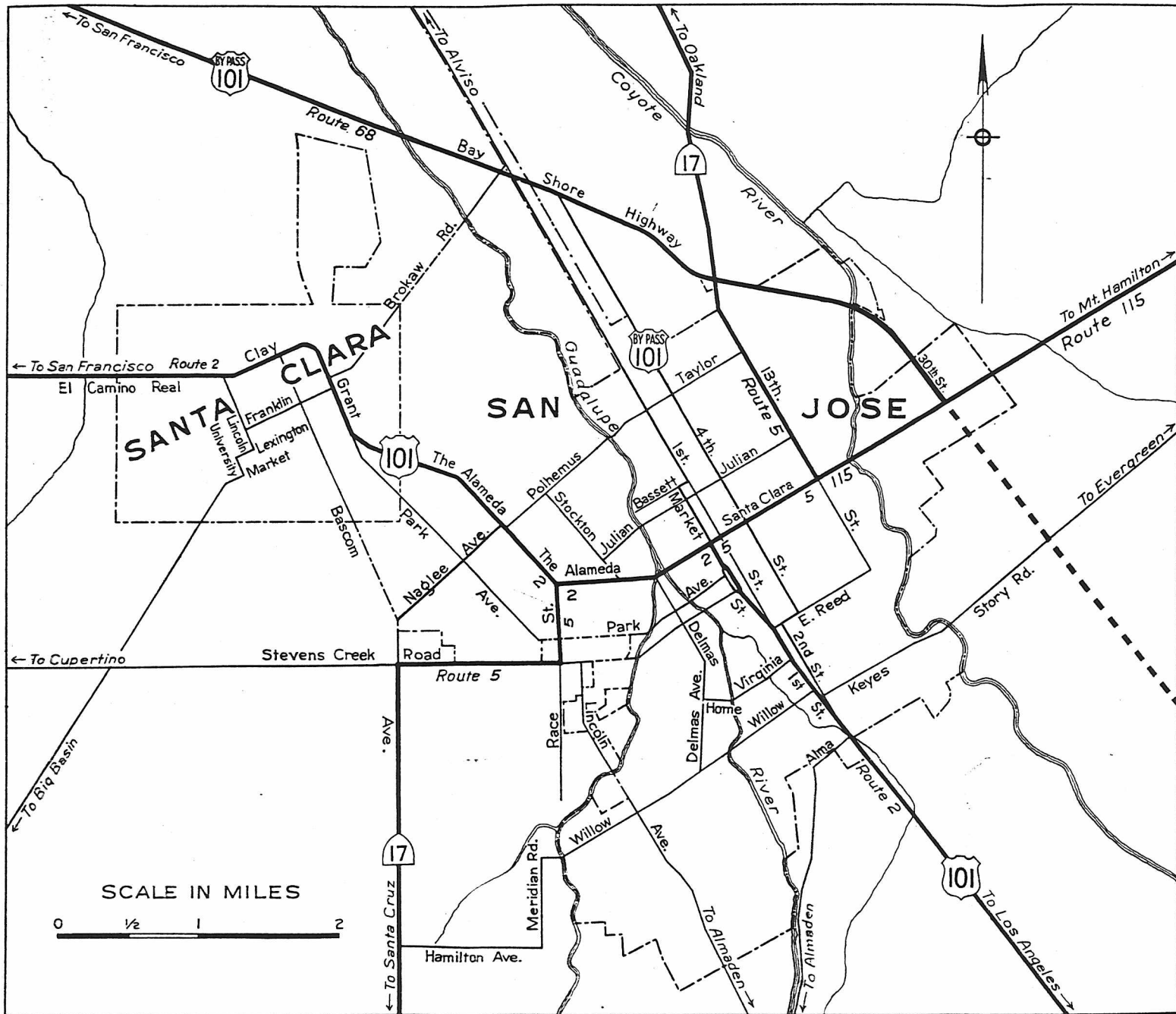
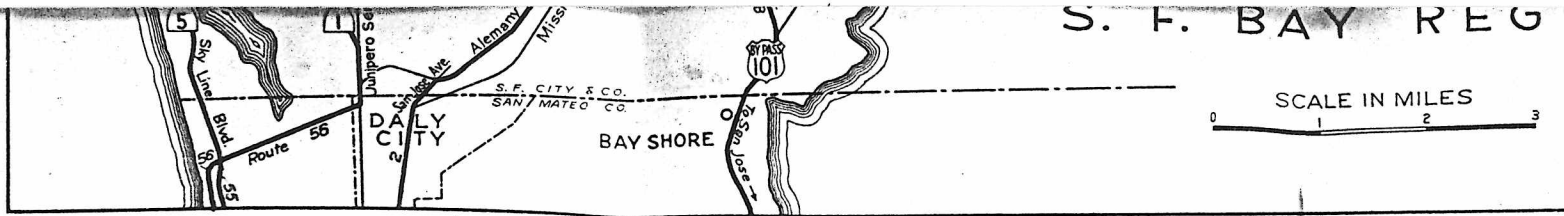
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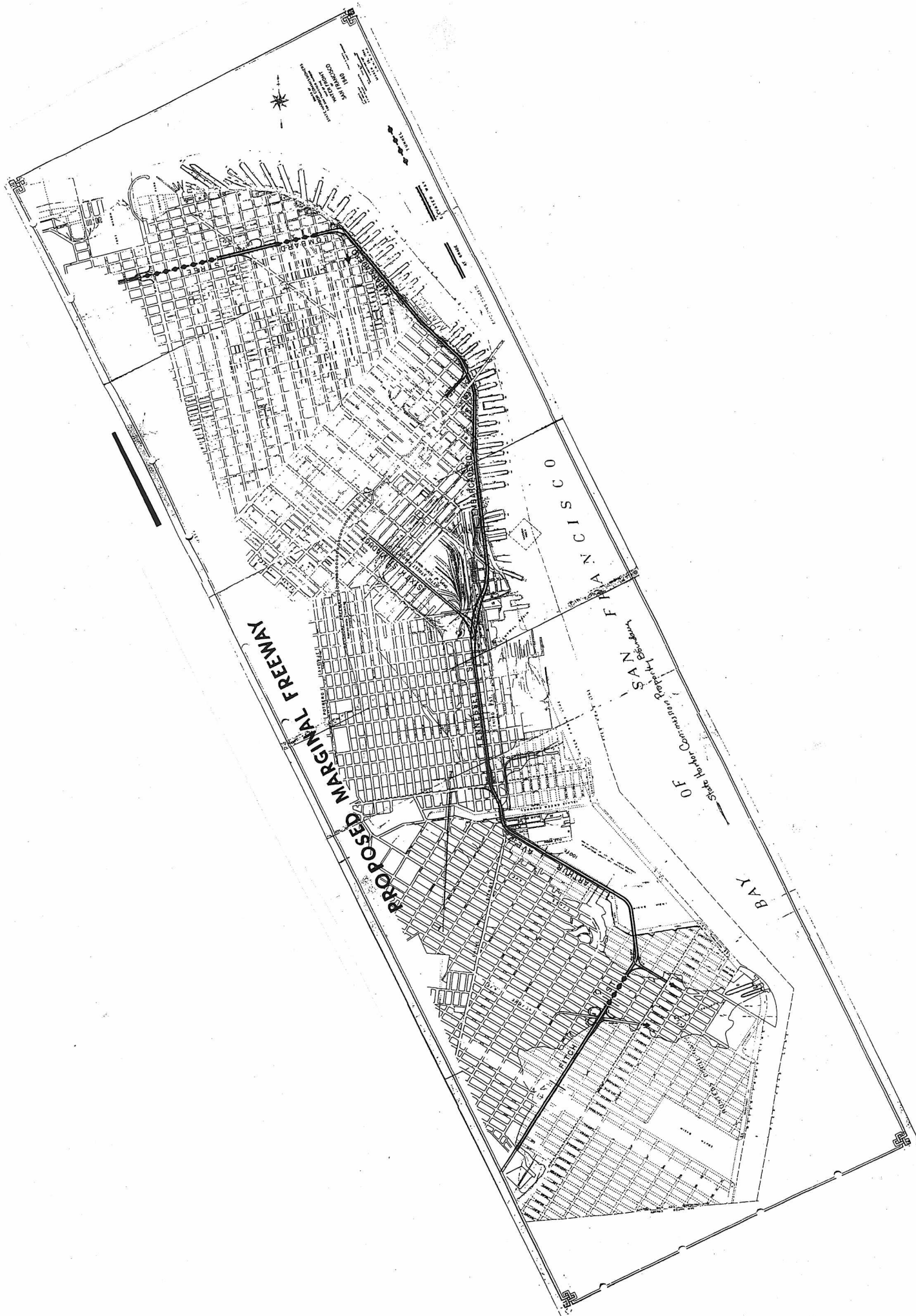


CITY LIMITS SHOWN
FIGURES SHOWN 23 INDICATE STATE HIGHWAY NUMBERS AS DESIGNATED BY STATE LEGISLATURE.

1944







CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION

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Necessity of Changing the Location of the
Proposed Bayshore Freeway
in the Vicinity of the
San Francisco Airport

File
Relocated Highway
opened to traffic
Jan. 5, 1948

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DOCUMENTS DEPT.

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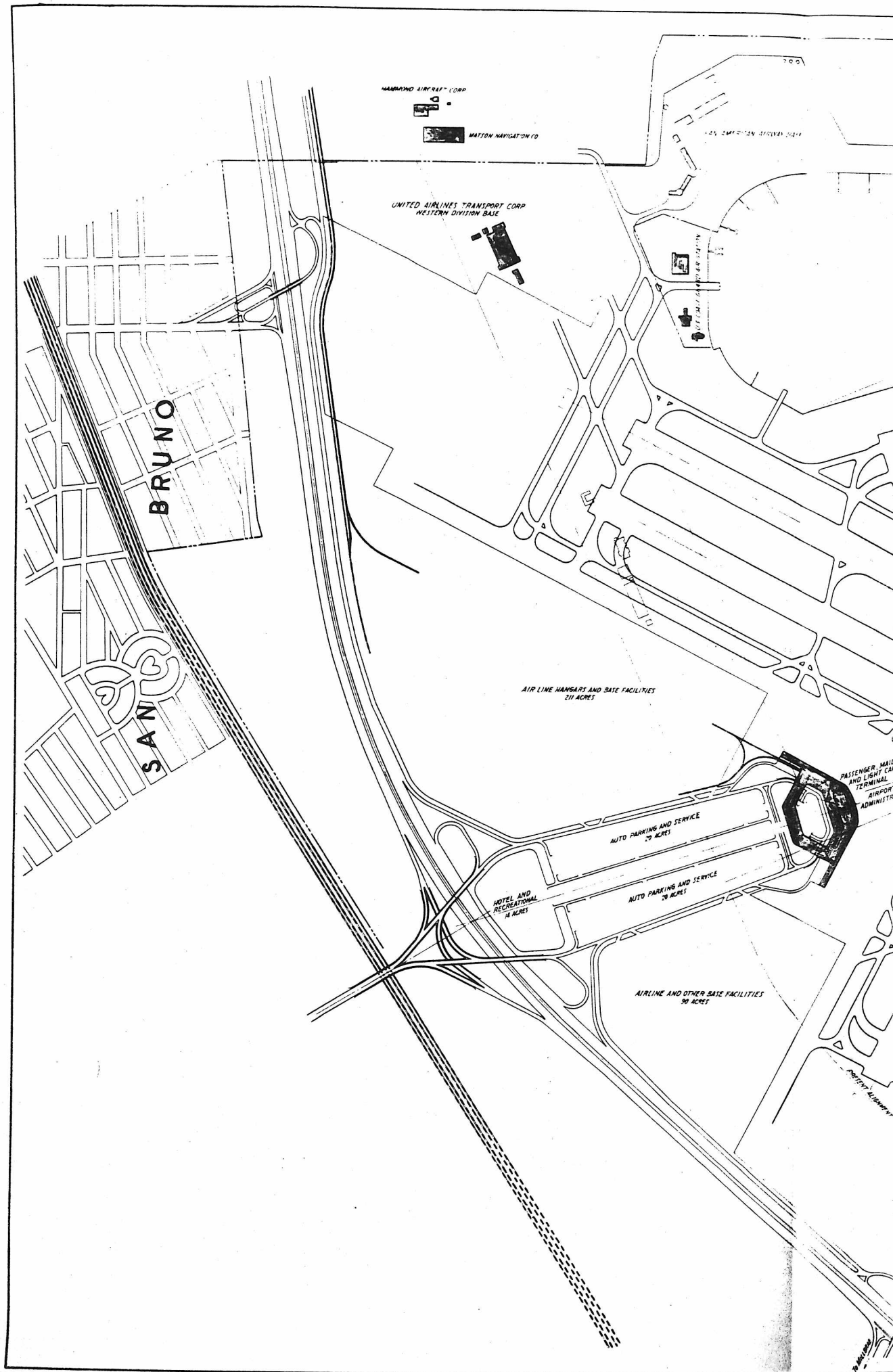
SAN FRANCISCO
PUBLIC LIBRARY

E. G. CAHILL, Manager of Utilities

MARCH, 1944

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REPORT OF THE SAN FRANCISCO PUBLIC UTILITIES COMMISSION
ON

Necessity of Changing the Location of the Proposed Bayshore
Freeway in the Vicinity of the San Francisco Airport.

The California State Highway Commission in July, 1940, proposed a reconstruction, widening and partial realignment of the existing Bayshore Highway to establish a freeway between San Francisco and San Jose.

The plans included a number of expensive abandonments and realignments, such as construction of an earth fill directly across Brisbane Bay to connect Sierra and Candlestick Points. On that portion of the highway which passed through San Francisco Airport property, however, for a distance of one and three-eighths miles, creating a serious traffic hazard and further retarding the expansion of the airport to the west, no such realignment was proposed.

Assuming this to have been an oversight, the Public Utilities Commission made known its objections to the Highway Commission's plans and pointed out that:

(1) The Public Utilities Commission had acquired 550 acres to the west of the existing highway to provide adequate areas for construction of new hangars, buildings and extensive ground facilities to meet the phenomenal increase in air commerce demands.

(2) The proximity of the existing highway to the airport runways had already proven itself to be so dangerous as to have caused a staggering toll of fatalities and that the widening, heightening and clover-leafing of the existing facility would not only worsen this condition, but would render the western 550 acres wholly useless for expansion purposes.

The Commission exhibited to the State highway engineers tentative plans and studies then in process of development and proposed that in view of the magnitude and permanency of the State's freeway plan, that the State, in turn, envisage the present and future requirements of the airport which would ultimately make removal of the freeway to the west imperative.

Several meetings were held between representatives of the two agencies, but except for one survey and estimate of cost of realignment of the freeway to the west, the State highway engineers appeared unconvinced of the soundness of the City's position for approximately three years.

Early in 1943, the San Francisco Chamber of Commerce, which, in common with all farsighted groups, supported the State's proposal for construction of the freeway, recognized the nature of the impasse, and requested and received from the City its plan and studies for realignment. These were also furnished the State's engineers for their study and review.

Although the State engineers requested and received from the City additional engineering data, they made no comment or formal reply to these studies until November 18, 1943, at which time they submitted to the City, the Chamber of Commerce, The Down Town Association and numerous other agencies and organizations, a report entitled:

"REPORT ON FEASIBILITY OF SHIFTING SAN FRANCISCO MUNICIPAL
AIRPORT (MILLS FIELD) TO THE SOUTHEAST."

Thus, after more than three years, the State engineers are brought into tacit agreement with the City's contention that the highway as now located is a barrier to necessary airport expansion. In fact, so thoroughly are they in agreement with this contention that they propose the remarkable expedient, not of shifting the highway, but of shifting the airport.

The problem is that of weighing and determining the respective merits and costs of a shift of the highway to the west, or a shift of the airport to the east.

A shift of the highway to the west would merely lengthen the freeway to San Jose by 1400 to 2000 feet, while a shift of the airport on the basis of ultimate plans not approved by the Civil Aeronautics Administration might disrupt air connections between San Francisco and all the rest of the nation.

RELATIVE MERITS OF PROPOSALS

The State proposes, as a logical method of obtaining adequate ground area for airport expansion purposes, the removal of the entire airport southeast, a sufficient distance so that enough new area east of the present highway can be developed to offset loss of the 550 acres the City already owns west of the highway, and which would have to be abandoned for airport purposes.

This proposal, regardless of its feasibility as to long-range effects, entirely overlooks the necessity of setting aside

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California Highway Commission Gives Help to San Francisco On Postwar Airport Project

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NEGOTIATIONS between the City of San Francisco and the California Highway Commission on the relocation of the Bayshore Freeway, U. S. Highway 101 BY-PASS, in the vicinity of the San Francisco Municipal Airport, were climaxed on September 21st when a mutually satisfactory agreement opening the way for postwar development of the airport was reached by the city and the State.

The commission, meeting in San Francisco, adopted a resolution agreeing to relocate a portion of the Bayshore Highway near the airport, to relinquish title to its present right of way through airport property and binding San Francisco to an agreement to "construct a facility equal and equivalent to the standard of the existing road," and to build the additional length of freeway which will be required by the shifting of the present highway to the western boundaries of existing airport property. The additional length will be between 1,400 and 2,000 feet.

The resolution was approved by the San Francisco Public Utilities Commission on September 25th.

It had been the plan of the Highway Commission to develop the Bayshore

Freeway along its present location through airport properties. The Public Utilities Commission, however, desired to extend the airport both east and west by "stage construction" and felt that a freeway through the middle of the field would hamper development.

The formula for the agreement was reached when the city offered to pay the additional expenses involved in relocation of the freeway along the western boundaries of the airport. The present highway bisects the airport with 2,450 acres on one side of the roadway and 550 acres on the other. Shift-

ing of the freeway to the west will permit the consolidation of the 2,900 acres of airport land into one large field.

Headed by their chairman, C. H. Purell, who is also Director of Public Works; State Highway Engineer George T. McCoy, and Assistant State Highway Engineer Fred Grumm, the Highway Commissioners inspected the airport properties and the proposed relocation site on September 20th. They were accompanied by Mayor Lapham; Marshall Dill, President of the Public Utilities Commission; E. G. Cahill, Manager of Utilities; Chief Ad-

ministrative Officer T. A. Brooks, and B. M. Doolin, Airport Manager, representing the City of San Francisco.

In a statement commenting upon the agreement, Mr. Cahill said:

"The sympathetic hearing accorded the San Francisco delegation and the prompt action of the Highway Commission in reaching a basis for a working agreement, are highly appreciated by Mayor Lapham, Mr. Dill, and myself.

"We will now be able to proceed much more rapidly toward completion of the master plan for the airport and hasten the date when it will take its rightful position as the leading airport in the west."

RESOLUTION

WHEREAS, The City and County of San Francisco, through the Mayor and Public Utilities Commission, have informed the California Highway Commission of its desire to enlarge the San Francisco Municipal Airport, known as "Mills Field," by stage construction, both to the east and west of the existing airport as its ultimate program; and

WHEREAS, The City and County of San Francisco has requested the removal of a portion of State Highway Route 68 so as to clear the same for use for airport purposes; and

WHEREAS, The City and County of San Francisco offers to construct a facility equal and equivalent to the standard of the existing road on a location to be selected by the California Highway Commission; and

WHEREAS, The City and County of San Francisco offers to build the additional length of completed freeway required over that necessary had the State Highway remained in its present position; and

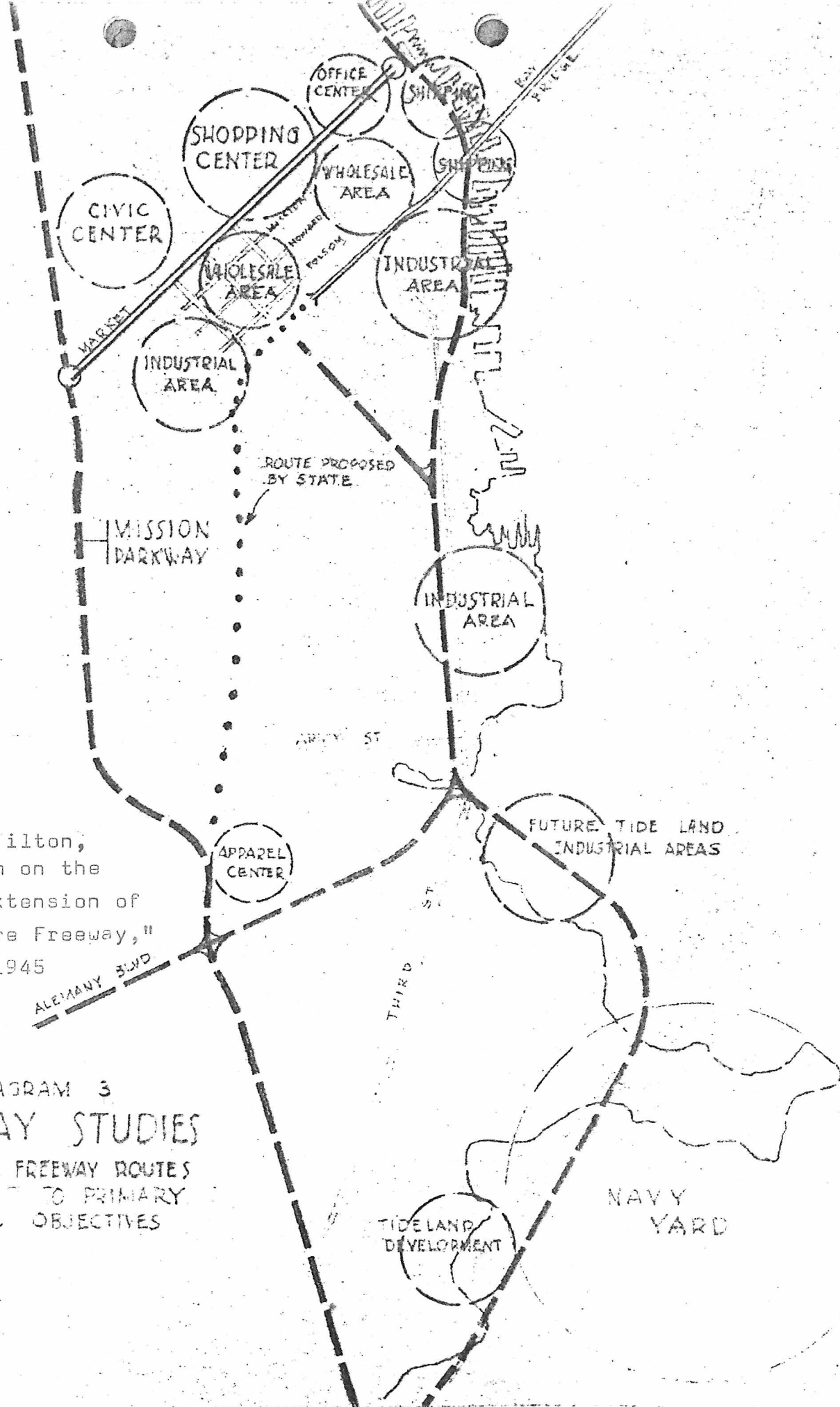
WHEREAS, The City and County of San Francisco offers to furnish a right of way satisfactory to the State through city owned property; now, therefore, be it

Resolved, That the California Highway Commission agrees to relinquish title to its present right of way when the City and County of San Francisco enters into an agreement with the State in accordance with the offers hereinabove recited and when such relocated highway has been constructed; and it is further

Resolved, That on acceptance of the conditions in this resolution by the legally authorized authority of the City and County of San Francisco, the State Highway Engineer will be instructed to proceed with the completion of the engineering involved.

L. Deming Tilton,
"Memorandum on the
proposed extension of
the Bayshore Freeway,"
April 26, 1945

DIAGRAM 3
FREEWAY STUDIES
ALTERNATE FREEWAY ROUTES
AS RELATED TO PRIMARY
TRAFFIC OBJECTIVES



THE MARGINAL FREEWAY PROJECT

Recommendations

1. That an allotment of \$6,000,000 be made in the funds for the Postwar Program, for the construction of a tunnel through Russian Hill, the detailed location of the tunnel to be made the subject of joint study between the Public Works Department and the City Planning Commission.

2. That the section of the Marginal Freeway between Third Street and Hunters Point Navy Yard be considered a specific project in the postwar program and that the sum of \$1,034,000 be allocated therefor, contingent upon approval of the related Tideland Reclamation Project.

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Need for Freeways

Vehicular expressways, commonly called "freeways" are the means of relieving traffic congestion. All the larger cities are now planning extensive systems of expressways as a major part of postwar planning. That such construction is vital to San Francisco is agreed by all who have investigated the matter. The only differences of opinion are as to the location and as to which routes should receive priority in the construction program.

In the matter of location, the question generally arises whether to lead the freeway to the heart of the most congested area or to adopt a circumferential route. Generally, the latter course is considered preferable in order to disperse the traffic and also to avoid the high costs involved in cutting through high valued business property. It was with this thought in mind that the City Planning Commission proposed the Marginal Freeway. However, the State Highway Department, with the concurrence of city officials has decided otherwise and has adopted a route directed towards but stopping short of the Central Business District.

The Bayshore Freeway

The Bayshore Freeway, Plate I, as adopted runs parallel to the present Bayshore Blvd.-Potrero Avenue State route connecting with the San Francisco-Oakland Bay Bridge at 5th Street between Bryant and Harrison, with ramp connections at the principal intersecting arteries.

The principal objection of the City Planning Commission to the proposal is that it will add a heavy concentration of traffic to that presently discharged at the same point by the main approach to the Bay Bridge. The congestion, not only of vehicular traffic but also of mass transportation on Market Street results, to a very large extent, from the Bay Bridge traffic destined to points North of Market. This acute condition will become intensified upon completion of the new facility.

The Bayshore Freeway will have three traffic lanes in each direction and an ultimate capacity of 60,000 vehicles daily. The State Highway Department estimates traffic of 55,000 vehicles on a part of the route by 1957. If the Greyhound bus lines should take over the Southern Pacific Peninsula commuter traffic, it is possible that this estimate will prove to be low. In any event, long range planning requires that consideration be given now to a supplementary route.

The Marginal Freeway

As part of the Six-Year Postwar Plan, the City Planning Commission requested that funds in the amount of \$8,000,000 be allocated to construction of the Marginal Freeway. It was considered that this amount, in conjunction with the funds made available through the State Highway Department would insure the completion of the facility at an early date. The adoption of the Bayshore route alters the situation, but does not eliminate the proposal, as this route merits independent approval.

The Marginal Freeway may be described by sections as follows:

- I. The Lombard Street Tunnel from Franklin to Columbus Ave.
- II. A viaduct crossing Columbus, Mason and Powell Streets.
- III. A tunnel through Telegraph Hill to connections with Sansome and Battery Streets.
- IV. An elevated highway along the Embarcadero to China Basin, with some special treatment in the Ferry Building Area, subject to further study.
- V. A Freeway, partly elevated, partly at grade between China Basin and Islais Creek.
- VI. A section at grade on reclaimed tidelands from Islais Creek to the Hunters Point Navy Yard.
- VII. A section at grade extending south from Hunters Point on reclaimed tidelands to a connection with the Bayshore Freeway near the County Line.

Not all of these sections are of equal importance, so that a separate discussion of each section is required.

I. Lombard Street Tunnel. For many years there has been discussion of a tunnel through Russian Hill, the suggested locations, generally, being either Broadway or Lombard Street. The Public Works Department has requested that funds in the amount of \$3,200,000 be included in the Postwar Program for the construction of the Broadway Tunnel. There is no question as to the necessity of a tunnel in this general location. Because of its shorter length, the Broadway Tunnel would be the least expensive, the estimate for the Lombard Street Tunnel being \$6,000,000.

The objections of the City Planning Commission to the Broadway location have been outlined in the "Supplemental Report" of the City Planning Commission dated April 18, 1945.

It is recommended (a) that provision be made in the Postwar Program in the amount of \$6,000,000 for a tunnel in this general location and (b) that the Public Works Department and the City Planning Commission make a joint study to determine which of the two locations is in the best interests of the City.

Sections II - IV inclusive, have been proposed at various times by the City Engineer. The Director of Public Works states that these projects are not at present urgent.

The City Planning Commission agrees that, outside of certain delays occasioned by switching operations along the Embarcadero the existing facilities are sufficient to meet actual traffic needs. For the present, therefore, it appears only necessary to adopt the most feasible route and, if possible "protect" it by taking steps to prevent expensive construction on the selected alignment.

Section V A similar conclusion holds for the section between China Basin and Islais Creek. Third Street has recently been widened to provide 3 traffic lines in each direction and has sufficient capacity to carry traffic along this section for the present.

Section VI is intimately connected with and forms an essential part of the Tideland Reclamation Project recommended in the "Memorandum on Tideland Reclamation" of June 6, 1945. In that report the amount of \$684,000 was allocated for right-of-way for a section of the Marginal Freeway.

The development of this property will require a highway along the waterfront. Incidentally, this highway will form a decided improvement on present means of access to the Navy Yard. The construction cost of the highway is estimated at \$350,000.

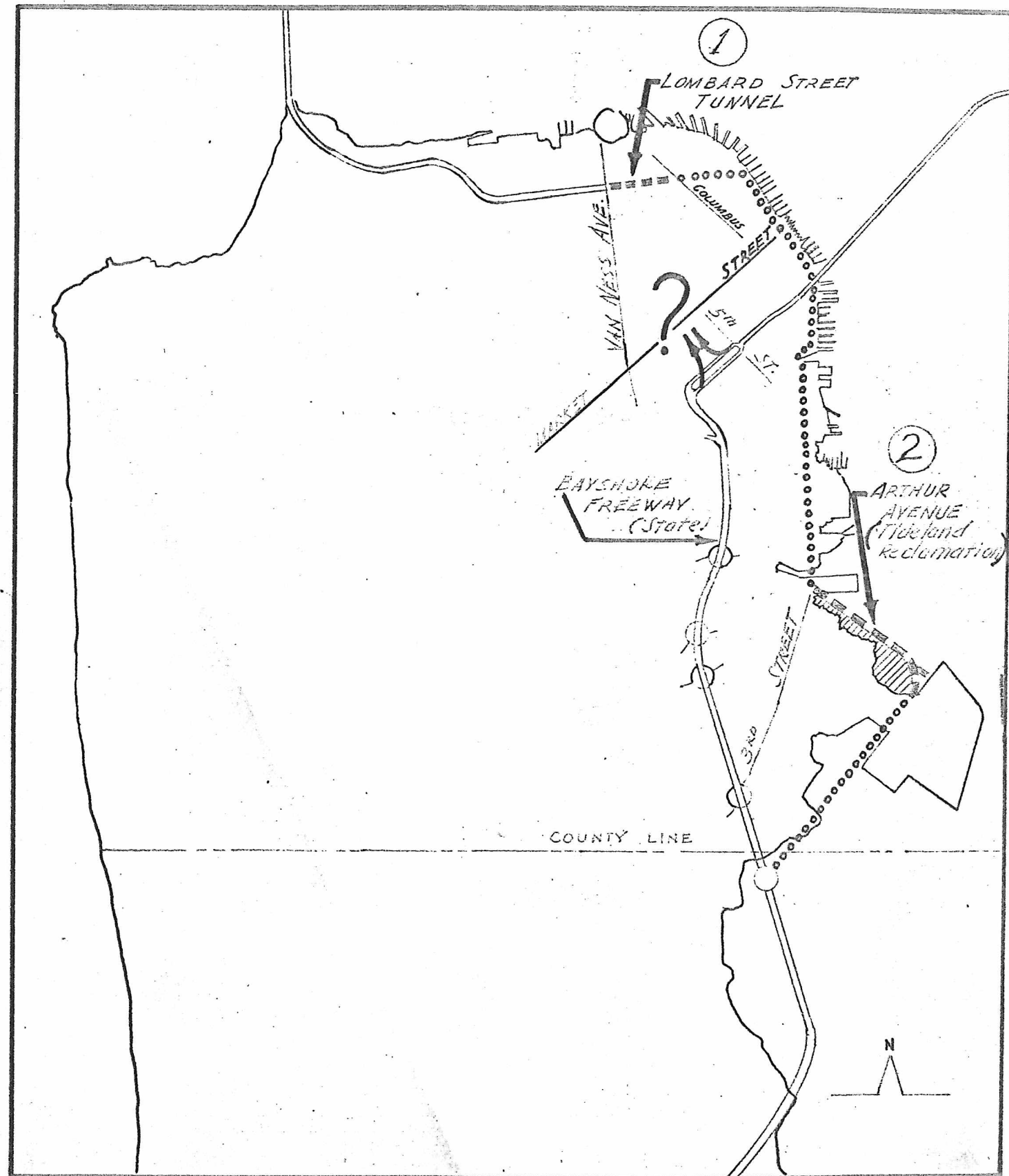
Section VII similarly forms an essential part of Tideland Reclamation Project No. 2 described in the Report of June 6th. In that report, Project No. 2 was outlined as a future project. The same applies to this section of the freeway.

Related Construction on Connecting Streets

The adoption of the Bayshore Freeway for early construction greatly affects all street planning in San Francisco. The Public Works Department recognizes this fact and proposes, for early construction, an extensive system of improvements to connecting streets. The City Planning Commission concurs in the general conclusion reached by them.

The Commission has not had time, however, since the adoption of the Bayshore Route, to make a complete study of the required connections. Further study on the part of the Public Works Department and the Commission may indicate that improved facilities for crossing Market Street are even more urgently needed than some of the connections presently proposed.

In any event, there is no doubt that the funds in the amount requested by the Public Works Department will be needed. It is recommended that their requests be approved with the understanding that should further study indicate desirable changes in the details of the program, transfers of funds to alternative projects can be made as agreed upon.



BAYSHORE FREEWAY WORK IS STARTED

By R. P. DUFFY, District Construction Engineer

WORK at a cost in excess of two and one-half million dollars has been placed under contract on the Bayshore Freeway in Santa Clara County between Santa Clara Street in San Jose and Ford Road 8.74 miles southerly thereof.

This project is the first unit to be placed under contract in District IV, a highway designed on freeway principle and will eventually extend from San Francisco to El Camino Real south of San Jose.

It will provide a route for through traffic, by-passing the congested area that now must be used through San Jose.

Four contracts have been awarded this unit, three of which involve the construction of structures and one providing for grading and paving.

Two of the structure contracts, one constructing a reinforced concrete bridge over Coyote Creek and an undercrossing at Coyote Road and one constructing an undercrossing at Ford Road, were awarded to Contractor

Earl W. Heple of San Jose in December, 1945 at a cost totaling more than \$355,000.

The third structure contract for which bids were received on March 13, 1946, found Frederickson & Watson Construction Company of Oakland low bidder on the interchange structure at Santa Clara Street in San Jose with a bid of \$379,500.

These structure contracts are being supervised by the Bridge Department of the Division of Highways and on which Associate Bridge Engineer G. W. Thompson has been assigned as Resident Engineer.

The road contract, for which bids were received on December 12, 1945, was awarded to Contractor N. M. Ball Sons of Berkeley at a cost of \$1,269,000.

The project involves an entirely new location and traverses the gently sloping floor of the Santa Clara Valley except for a section, slightly less than two miles in length, in the vicinity of Coyote Creek where the line penetrates the foothills and from which source the

major portion of the embankment material is obtained.

The alignment, exclusive of the Ford Road interchange, contains only three curves involving a total curvature of $72^{\circ} 18'$ with a minimum radius of 3,000 feet. At the Ford Road connection to El Camino Real at the south end of the project the radii are 1,500 feet.

The maximum grade rate is 2.1 per cent except for the rise over the Ford Road undercrossing where there is a short piece of 4.2 per cent grade.

The maximum elevation reached on the project is 204 feet and the minimum elevation is 98 feet.

The new construction provides a four-lane Portland cement concrete pavement with two lanes in each direction of traffic divided by a 36 foot width division strip.

The pavement design is of 8 inches uniform thickness without expansion joints but with weakened plane joints on 15-foot centers. Contact joints will have $\frac{3}{8}$ inch x 15 inches tie bolt assemblies spaced at 30 inch centers.

Rock cut being excavated and hauled to fill. Smoke in background is from burning brush in clearing operations.





Here a Terra-Cobra with caterpillar dozer pusher is excavating rocky material

This pavement is placed on an average fill of about three feet above the original ground, the top foot of which is constructed of selected material from the roadway cuts.

The right of way provided for this unit is 180 feet in width with added

widths where necessary for present and future interchange structures at public road intersections. The approximate cost of this right of way is \$550,000.

The road contract proposal carries unit prices on 53 items of work, some of the major items being 660,000 cubic

yards of roadway excavation, 600,000 square yards of compaction of original ground, 43,000,000 station yards overhaul and 50,750 cubic yards of Portland cement concrete pavement.

The grading equipment now in use by the road contractor consists of a

(Continued on page 26)

This photograph, looking south, shows completed rough grade in side hill cut





Looking northerly from Sixth Street Bridge. In foreground reinforcing of an existing storm drain which will be under quite a high fill is in progress

contingency fund, for the road-work project amounts to \$1,435,325.12.

The contract allotment for the Fourth Street Bridge amounts to \$145,204.50; and the allotment for the Seventh Street Bridge amounts to \$239,821.05.

Work was started on the Fourth Street Bridge on January 22, 1946, and on the roadway on January 31, 1946. Both projects are proceeding at an excellent rate of progress.

One of the interesting features of the work consists of the jacking of a 36-inch reinforced concrete pipe under three tracks of the Union Pacific Railroad Company's main line and under a warehouse. This work was subcontracted to the Armco Drainage & Metal Products, Inc., and is approaching completion, the work having been

carried on in a remarkably smooth manner, cooperation between the contractor and the Union Pacific being excellent.

ROUTE SKIRTS PLANTS

This Kearney-Soto portion of the Santa Ana Freeway, 1.6 miles in length, is located through an area which was occupied by many substandard dwellings, and skirts housing projects that were constructed prior to the war; but these housing projects were located to conform to the freeway right of way. The freeway also skirts many industrial plants; but it was possible to avoid interfering with any of the large establishments.

Mr. H. C. Studer is job superintendent for Peter Kiewit Sons' Co.; and Mr. E. A. Parker is Resident Engineer

for the State on this job. Mr. George K. Thatcher is job superintendent for Byerts & Dunn; and Mr. A. K. Gilbert is Resident Engineer on the two bridges.

BAYSHORE FREEWAY

(Continued from page 4)

fleet of R.D. 8 tractors and carryalls of various capacities, four 15-cubic yard Woolbridge Terra-Cobras, a fleet of 20-cubic yard dump trucks and a 2½-cubic yard shovel.

Barring unforeseen delays, this project should be opened early in 1947.

The roadwork is being executed under the general direction of Jno. H. Skeggs, District Engineer, with Mr. A. Walsh, Resident Engineer, in immediate charge.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

COMPILATION OF DATA

In Reference to Public Hearing
before

Joint Army and Navy Board

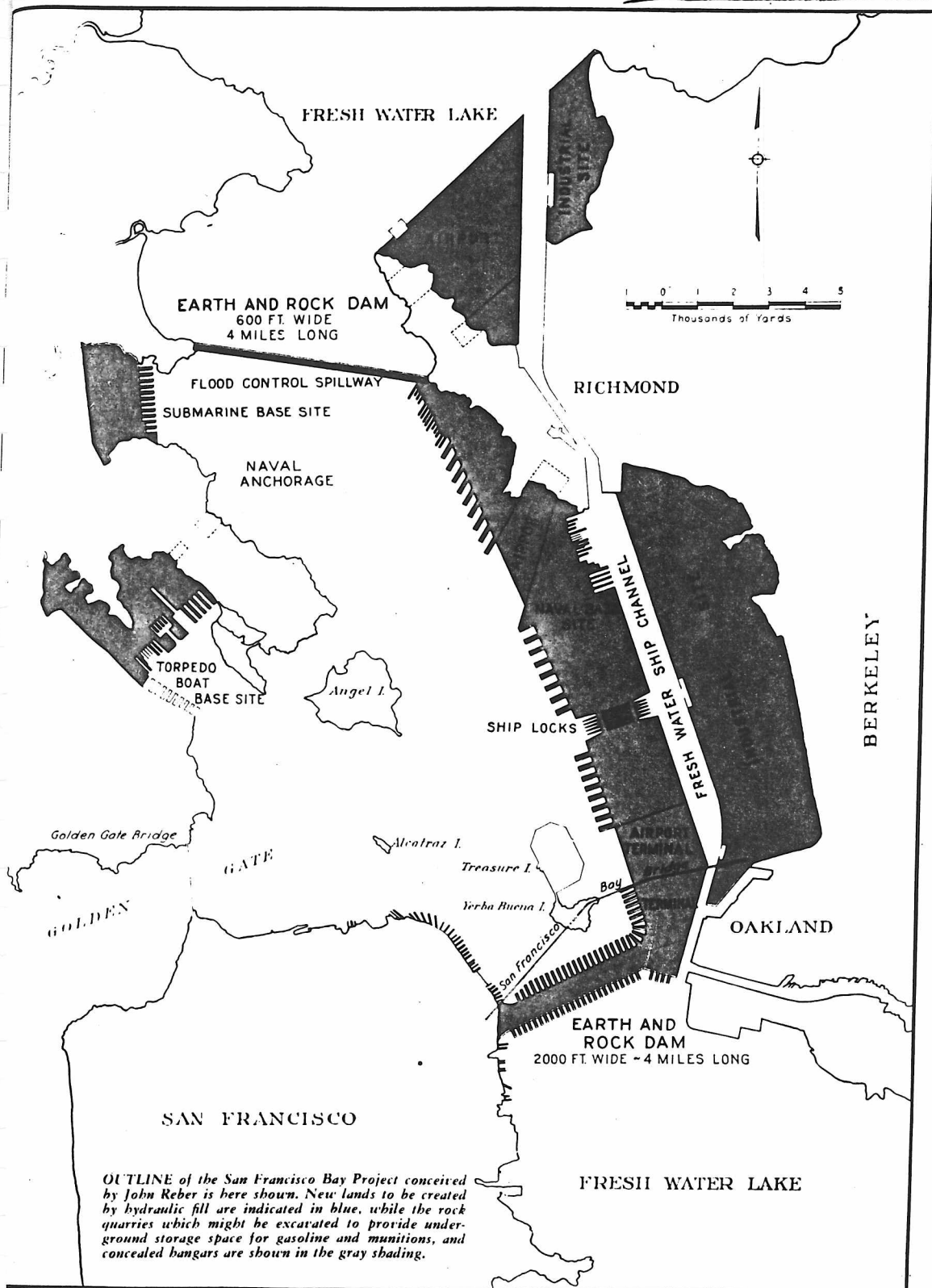
Pursuant to House Resolution 529

79th Congress, 2nd Session

San Francisco, California

August 12, 1946

SAN FRANCISCO BAY PROJECT—THE REBER PLAN



San Francisco Bay Project

Reber Plan proposes that the south arm of San Francisco Bay and the smaller bays north of San Quentin Point be transformed into fresh water lakes by construction of earth and rockfill dikes which would provide new land areas for military and naval establishments, industrial development, and unlimited transportation facilities

THE SAN FRANCISCO Bay Project, a proposed construction job of sufficient magnitude to rank well up on the list of major western projects, is gaining adherence as a sound proposal that would immeasurably strengthen the military defense of the Bay Region and provide facilities which would make the area the industrial center of the Pacific Coast. The project would increase the deep water harbor line by 50 mi., establish salt water barriers across both ends of San Francisco Bay, forming fresh water lakes with a total area of 280,000 ac., and provide about 20,000 ac. of newly created land available for transportation, manufacturing, military and naval purposes, and unifying the metropolitan area with rapid transportation across the bay.

Features of the project

Essence of the plan consists of two earth and rockfill dikes or moles, the first reaching from San Francisco to West Oakland, and the second from Point San Quentin to Castro Point, west of Richmond; a ship channel along the east side of the bay, extending from Alameda to Pinole Point; hydraulic fill of the shallow east shore of the bay over a 3 mi. width; and a multiple ship lock between the bay and ship channel. Two years ago, construction of the essential features and appurtenant structures necessary to place the project in operation, was estimated to cost about \$120,000,000.

For more than 10 years the idea of this development has been growing in the mind of John Reber, pro-creator of the plan. Conceived as a means of providing better military and naval and air force facilities, the plan opens wide possibilities for future industrial, agricultural, residential, and recreational development, as well as possible solutions to current water supply, flood control and transportation problems. Development of the plan would affect not only the entire San Francisco Bay region, but also both the San Joaquin and Sacra-

mento Rivers as well, together with their adjoining lands as far upstream as Sacramento and Stockton.

Bay divided by dikes

As is shown on the accompanying map, San Francisco Bay would be divided into three parts under the proposed plan. The central portion of the bay from a line south of the San Francisco-Oakland Bay Bridge to a line from Point San Quentin to Castro Point would constitute the deep, salt water harbor. The large south arm of the bay would be transformed into a fresh water lake, with surface elevation held constantly at about highest high tide level. The north arm of the bay, including San Pablo Bay, Carquinez Strait and Suisun Bay would likewise become a fresh water lake, with the surface elevation also held at high tide level.

Division of the bay into these three parts would be accomplished primarily by two large earth and rockfill dams. The larger of these would extend from the San Francisco shoreline at Rincon Point to a point in the bay opposite the mouth of the Oakland estuary. The embankment to be constructed in this location is proposed to be about 2,000 ft. wide and 4 mi. long. In this locality, the deepest section of the bay is off-shore San Francisco, where the bottom of the bay is about 72 ft. below low tide. The mole would be built as a solid fill with dumped rock seawalls on both sides and hydraulic fill between. The surface of the mole would be constructed to an elevation 13 ft. above low tide, making a total height of fill of about 90 ft. The second dam, somewhat smaller than the first, would be 600 ft. wide and about 4 mi. long, extending from Castro Point, west of the Standard Oil refinery at Richmond, to San Quentin Point in Marin County. In this locality, the maximum water depth in the bay is about 51 ft. The type of construction would be similar to the larger mole, except for flood outlet provisions.

In order to provide passage of flood waters from the Sacramento and San Joaquin Rivers to the ocean, the entire upper mole would be constructed as a spillway, built to high-tide level on the fresh water side and to low-tide level on the salt water side. A reinforced concrete causeway, conceived as a long series of arches, would be constructed on the mole, and provide the right-of-way for highways and railroads over the flood control spillway. Special significance is placed on these all-land crossings of San Francisco Bay, as they are of such proportions as to be practically indestructible by enemy air or land attack.

The upper and lower moles would be directly connected by a hydraulic fill which would be constructed in the shallow waters on the eastern side of the bay. The hydraulic fill would extend about 3 mi. west of the Oakland-Berkeley shoreline, and from a point opposite the Alameda ferry slip on the south to Castro Point on the north.

Ship channel and locks

Bisecting the hydraulic fill off the east shore of the bay would be a fresh water ship channel designed to handle the largest ocean-going vessels. The channel would extend in a general north-south direction from Alameda to Pinole Point. At the southern end, it would provide access to the southern portion of the bay which would be transformed into a fresh water lake, to Alameda, and to both the inner and outer Oakland harbors. From the present Richmond Harbor to San Pablo Bay, the ship channel would be dredged through what is now solid ground. Early maps of San Pablo Bay show that the Point Richmond area was at one time an island with a waterway existing at the location proposed for the ship channel. The channel would be constructed to a maximum width of a half mile, and a minimum depth of 50 ft. A portion of the normal flow of the Sacramento and San Joaquin Rivers, instead of being wasted into the salt water of the bay, would be brought down through the ship channel and used to supply fresh water to the lower arm of the bay, and to supply the water requirements of surrounding lands and bordering cities. Shipping would have access to Oakland, Mare Island, the south bay and river ports through a multiple ship lock which would be constructed in the hydraulic fill west of Berkeley.

The Reber plan contemplates construction of 6 locks of varying sizes which would provide flexibility in handling traffic. Additional land would be created in the arm of San Pablo Bay, north of Richmond between San Pablo Point and Pinole Point, where dredging for the ship channel would make avail-

able large quantities of hydraulic fill material. In the estimates prepared about two years ago, it was calculated that approximately 796,000,000 cu. yd. of hydraulic fill would be required for all purposes, and it is believed that much of the material would be secured in construction of the ship channel. The remaining material would be dredged from the salt water harbor to provide a 50-ft. water depth over that entire area.

Creation of additional lands is also proposed for Marin County, where an 800-ac. fill might be constructed southwest of San Quentin Point and a 900-ac. area between Tiburon peninsula and Sausalito, north of Belvedere Island, since all hydraulic fill would be protected by rock wall embankments. It is estimated that 19,200,000 cu. yd. of rock would be required for construction of the project. This material could be secured from some six locations in the vicinity of the work, and excavation of the rock would provide important additional units of the project.

From three quarries in the hills of Richmond Point, rock for the seawalls could be excavated in such a manner that large underground storage spaces would be left available for use as hangars and as gasoline and ammunition storage. Two possible sites for similar rock excavation are available on Tiburon peninsula and in Marin County, and at Candlestick Point, south of San Francisco.

Transportation facilities

Construction of the large land areas in San Francisco Bay, as outlined in the preceding paragraphs, would permit direct land connections of all transportation systems between Marin County, the East Bay and San Francisco. The concrete causeway, planned for construction over the upper mole, would carry railroad facilities of the Northwestern Pacific across to the east side of the bay. The causeway would also carry highways on its 600-ft. width. Access to the causeway for both railroad and highways would have to be provided across the ship channel. For this purpose, the plan provides a sub-surface traffic tube with both railroad and highway lanes.

The lower mole, between Oakland and San Francisco, would carry a complicated highway system, consisting of four 6-lane roads, in addition to local streets which might be necessary. One highway would carry only traffic bound to and from Marin County and the north coast, another Richmond, Vallejo and Sacramento Valley traffic, a third, local inter-city traffic, and the fourth, San Joaquin Valley traffic, which might be taken off at Alameda and routed south of the Oakland business district to relieve city streets of the through traffic load. Highway crossings of the ship channel would be by means of sub-surface tubes, one to Alameda and one to Oakland. All railroads—the Northwestern Pacific, Western Pacific, Southern Pacific, and Santa Fe—would be routed through a common tube from West Oakland to the mole, where as many tracks as would be necessary could be provided for transportation directly to San Francisco.

Cost estimates

Altogether, the plan contemplates requirements for more than 18 major structures, including the concrete causeway to Marin County, a concrete overflow structure, 6 ship locks, and 10 highway or railroad tubes. In computing the probable cost of the project several years ago, it was considered that the immense amount of dredging and hydraulic fill required would justify construction of a special dredge, larger than any in use on the Pacific Coast at the present time, and one which would be able to operate at a smaller unit cost than might ordinarily be considered. On this basis, the cost of dredging and filling was placed at 6 cents per cu. yd. Excavation, transportation and placing of the rockfill were estimated at 75 cents per cu. yd., without taking into account the fact that the resulting quarry excavations might be available as underground storage areas.

The estimate for construction of the 6 ship locks was taken from the report prepared by Walker R. Young on the construction of a salt water barrier in the upper reaches of San Francisco Bay. The complete estimate for the principal basic features of the project is given in the following table:

Sand fill—by dredging operation, 796,000,000 cu. yd.	
@ 6c	\$ 47,500,000
Rock fill—19,200,000 cu. yd.	
@ 75c	14,400,000
Concrete causeway to Marin County	4,000,000
Concrete overflow structure	2,000,000
Concrete roadway to Oakland—16 lane	800,000
Six ship locks	23,000,000
Ten auto and rail tubes	25,000,000
Total	\$116,700,000

Military and Naval facilities

The author of the plan believes that the most important feature of the proposed project would be the additional military and naval and airforce facilities which could be provided as a part of the work. In addition to the underground storage facilities for hangars, gasoline and munitions, as previously mentioned, there are proposed two airports, larger than any now existing, a naval base site, a submarine base site, and a torpedo boat base. The largest airport would be situated north of Point Richmond, and include some 2,300 ac. Facilities could be provided for both sea and land planes, and an adjacent rock quarry site would permit the construction of underground hangars in the rock formation.

The second quarry adjacent to the site would also provide underground facilities for storage of gasoline or munitions. A naval airport, provided with underground hangars in rock formations is suggested for the area immediately south of Point Richmond, and adjacent to a proposed quarry site. A large naval base, with facilities capable of constructing and repairing the largest battleship would be constructed on the fill south

of Point Richmond, with drydocks, shipways, outfitting docks, and other facilities on both the salt water bay and the fresh water channel.

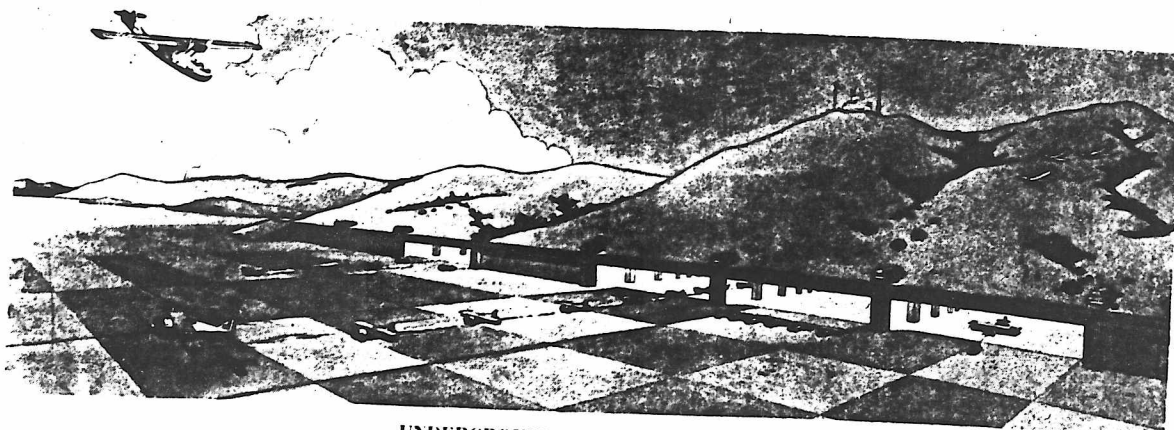
On the opposite side of the bay, in Marin County, the fill south of Point San Quentin might be a logical site for the construction of a large submarine base, and the fill in the vicinity of Richardson's Bay might be useful as a torpedo boat base. This use of new lands would be feasible as a result of the railroad and highway connections which would be established with the east shore under the project. The naval anchorage, which is now located south of the San Francisco-Oakland Bay Bridge, could be transferred under the project plans to the area north of Tiburon peninsula, and immediately south of the upper mole where 25 sq. mi. of 50-ft. deep anchorage would be available after dredging had been completed.

Industrial and commercial facilities

Between Yerba Buena Island and the east shore of the bay, the plan proposes location of a Grand Central Terminal which would serve ocean-going passenger ships, all railroad lines, all overland bus lines and air lines. Adjacent docks on the salt water side of the fill would permit passenger ships to dock at the doors of the terminal. Immediately to the north of the terminal could be located a central commercial airport, with facilities for handling both land planes and sea planes, and covering an area of 750 ac. Railroads will be provided with storage space adjacent to the terminal, so that passenger trains might be made up at the terminal for all schedules. Bus lines could also be accommodated at the terminal. All local facilities would be available for transporting in-coming and out-going passengers to all parts of the bay region.

All of the waterfront area which would be created under the plan, and not devoted to military or naval purposes, could be available for industrial use. Twelve miles of waterfrontage would be constructed which could be improved by the construction of piers and would provide 60 mi. of docking space on the salt water harbor, and an additional 20 mi. of harborline would be available on fresh water on the ship channel and the fresh water arm of the bay south of the lower mole. The total area of industrial land which could be created under the project would be about 20,000 ac.

Existing harbors at Oakland, in the upper reaches of San Francisco Bay and in the lower reaches of the Sacramento and San Joaquin Rivers would be benefited by the constant water surface elevation which would be held at about high-tide level. Ships entering the fresh water lake would benefit by the removal of barnacles and other marine growths which drop off in fresh water. With railroads and highways running directly into San Francisco, freight shipments would not have to be ferried across the bay. Development of the area by industry would result in the establishment of a well-planned and not too heavily concentrated industrial area which would



be within one hour's transportation of the metropolitan center.

Miscellaneous advantages

The average runoff from the Sacramento and San Joaquin Rivers is 28,000,000 ac. ft. per year. This runoff which has varied from 6,800,000 ac. ft. in dry years to more than 80,000,000 ac. ft. in wet years could be made available to a large extent by storage in the fresh water lakes at each end of the bay. At present, there are sizeable areas of salt water marsh extending along the shores of the bay, which when freshened might be utilized as agricultural lands, with water to be supplied during the irrigation season by pumping directly from the bay. There are several hundred thousand acres of marsh land thus available for reclamation, and an equal amount of higher lands that could be economically irrigated by water pumped from the bay.

Though the capacity of the fresh water lakes as conceived in the plan would be about 10,000,000 ac. ft., the water report on the project indicates that these lakes can be held at capacity at all times including allowances for losses by evaporation, ship lock and fish ladder operations. When Shasta dam is completed on the upper Sacramento River, a minimum guaranteed flow of 200,000 ac. ft. is expected from this stream, which should be sufficient to meet requirements for domestic, industrial and irrigation developments of the bay region.

The creator of the plan also points out the value of the two fresh water lakes for residential and recreational purposes and as tourist attractions. The lakes would be held at a constant level with a permanent and dependable shore line that would provide residential and resort areas of great value to the citizens of the bay area.

During the past year the project has gained many supporters, due especially to the major proposals for establishment of army, navy and air force facilities which would materially aid the activities carried on along the Pacific Coast in connection with the war in the Pacific theater of operations. Resolutions recommending governmental study and investigation of the project have been passed by the Senate of the California

UNDERGROUND HANGARS. it is suggested in the plan, could be built at several locations and the rock excavated to provide the hangars would be used for the rock embankment lining the hydraulic fill.

— From an original drawing by A. R. Hunt.

Legislature, the San Francisco Board of Supervisors, and numerous civic organizations. Senator Sheridan Downey's resolution (No. 194) in the U. S. Senate aims to include the project in the study and investigation of West Coast affairs by a sub-committee of U. S. senators from the Military Affairs Committee of that body.

Feasibility

Competent engineers who have had an opportunity to review the proposal advanced by John Reber, as outlined in this article, indicate that there is little question but what the project is feasible from an engineering point of view. Principal among the engineering problems are the questions of effect of the fills and reduction of the bay area on the tidal prism, and the extent to which the available water supply from the river would be required to replace evaporation and transpiration losses in the fresh water lakes. The matter of tidal prism has been considered and it is believed that no in-

surmountable obstacle is presented. Extensive studies, made in connection with the salt water barrier investigation some years ago, indicate that evaporation and transpiration losses would not constitute an excessive drain on the water supply.

Although construction of the dikes, themselves, together with the dredging and filling might present no problem other than the unusual magnitude of the project, construction of the flood control spillway, causeway, ship locks, and traffic tubes would be major problems in engineering construction. The list of incidental problems would not be inconsequential, but the military and naval importance of the project should overshadow all local questions that might arise. Aside from the transportation arterials across the bay, the project would be built in what are now shoal waters of the bay, and with a few exceptions, these are under the ownership of the State of California.

The cost of the project, its effect on navigation, and its importance to the army and navy place it in the category of matters to be decided by the Corps of Engineers, and indicate that it would necessarily become an undertaking of the Federal Government.

John Reber 207-208 Balboa Bldg., San Francisco
L. H. Nishkian, Member Am. Soc. C.E., Stock Exchange Bldg., San Francisco
Engineer-Consultant.

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WESTERN CONSTRUCTION NEWS

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March, 1942—WESTERN CONSTRUCTION NEWS

Comprehensive Plans of Public Works Dept Will Provide Easy Traffic Flow in City

By Sherman P. Duckel, Asst. City Engineer
City and County of San Francisco

THE PAST year has seen San Francisco off to a fine start on its program for the improvement of its sewage and sewage disposal systems. Unfortunately, the same is not true of its street and highway program. The many necessary improvements included in this program are essential to the continued growth of San Francisco and they should be undertaken without further delay.

There are a number of reasons why greater progress has not been made in the furthering of these improvements, the most important being the lack of funds. Since 1927, when the last bonds were voted for the construction of highways in San Francisco, the only funds made available for the improvement of its traffic arteries and streets have been the inadequate amounts allocated to the City from the Gasoline Tax.

FUNDS AVAILABLE

With the funds made available in the 1927 Bond Issue, major improvements such as Bayshore Boulevard, Alemany Boulevard, Junipero Sierra Boulevard, Great Highway, Sunset Boulevard, Nineteenth Avenue Extension, and Van Ness Avenue Extension, were constructed. Since that time only a few major arterials have been improved, namely: Park-Presidio Boulevard, Nineteenth Avenue, San Jose Avenue, and Lombard Street.

The vast majority of street improvements accomplished in the last ten years have been sidewalk narrowings and roadway reconstruction. Widening of the roadways by reducing the width of excessively wide sidewalks has been an economical and effective way of increasing the vehicular capacity of our streets. It is the writer's opinion that if it were not for this work the capacity of the streets, particularly south of Market Street, in the neighborhood of the bridge approaches, would be reduced by 3 to 35%.

STREETS IMPROVED

It is interesting to note that nearly all of the principal streets in the 100 vara district from Market Street to Townsend and Eleventh Street to the Embarcadero have been improved by sidewalk narrowings, with the exception of Mission Street. Plans are now completed and funds are available for the improvement of Mission Street from the Embarcadero to South San Ness Avenue.

For many years the Department of Public Works has had a comprehensive program for the improvement and construction of a system of streets, highways, and freeways so necessary to the free movement of traffic within the City. With

few exceptions and some modification this plan has been adopted by the City Planning Commission in its recently published Master Plan for San Francisco. In addition to the improvements included in the City's program, the State of California is planning several major improvements which will greatly affect San Francisco's traffic flow.

Rights of way are now being acquired by the State for the Bayshore Freeway. The section of this freeway within San Francisco, running from the County Line to connect with the Bay Bridge, is estimated to cost \$26,000,000. The State Division of Highways intends to call for bids on the first unit of this freeway between the Bay Bridge and Army Street in July, 1948. Probably within the next five years the construction of the Second Bay Crossing will be under way. Such feeders, together with the anticipated increase in automobile registration, will certainly bring a great increase in vehicular traffic to San Francisco's already crowded streets and thorough fares.

It is the function of the Division of Highways to construct these freeways into and through our City. It is the City's responsibility to provide a system of approach streets and highways connecting with these freeways which will provide means for the distribution of traffic throughout the City.

Since 1940, and during the war years, the City has accumulated enough of its Gasoline Tax Fund to finance only a small part of these projects. Funds are available and plans are completed for the construction of the Army Street connection to the Bayshore Freeway, together with the improvement and widening of a system of streets that will act as distributing arterials for the same. These include the physical widening of Guerrero Street and San Jose Avenue from Army Street to Bernal Cut.

The other two connections of this system, which are both under construction, include the extension of Clipper Street to Portola Drive and the improvement of Guerrero Street from Army Street to Market Street.

The total cost of this improvement is approximately \$1,700,000. Although all of the right of way for the Army Street improvement has been acquired by the Department of Public Works, the Board of Supervisors has not deemed it advisable because of the acute housing shortage, to



SHERMAN P. DUCKEL
Assistant City Engineer
City and County of San Francisco



H. C. VENSANO
Director
Department of Public Works

force the occupants of the City-owned improvements to vacate. The construction of this unit is, therefore, delayed.

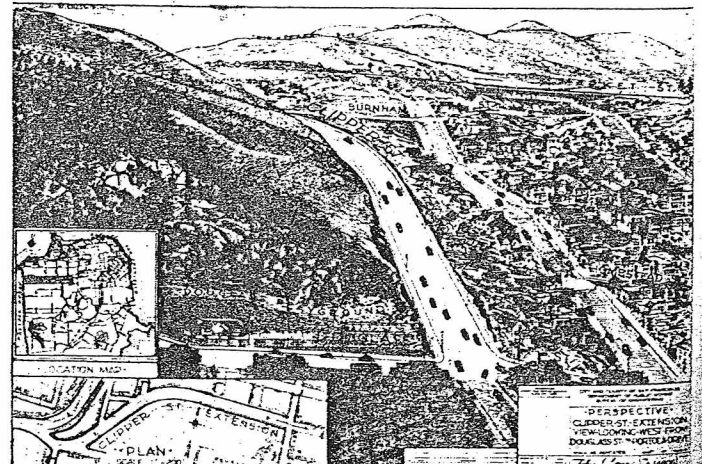
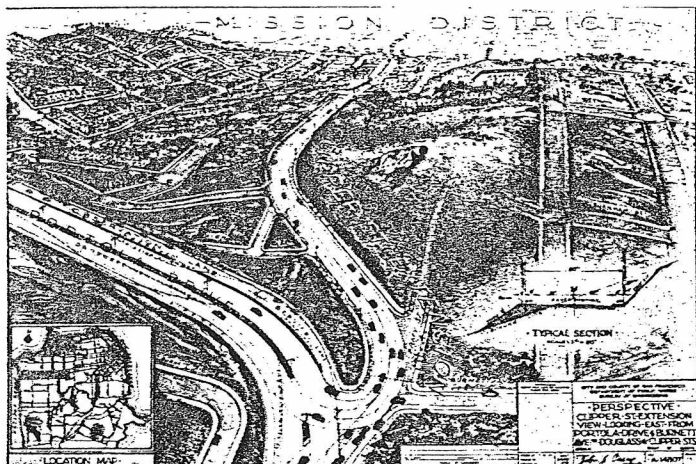
Following is a typical partial list of other projects which are all or partially financed and for which plans have been completed by the Bureau of Engineering:

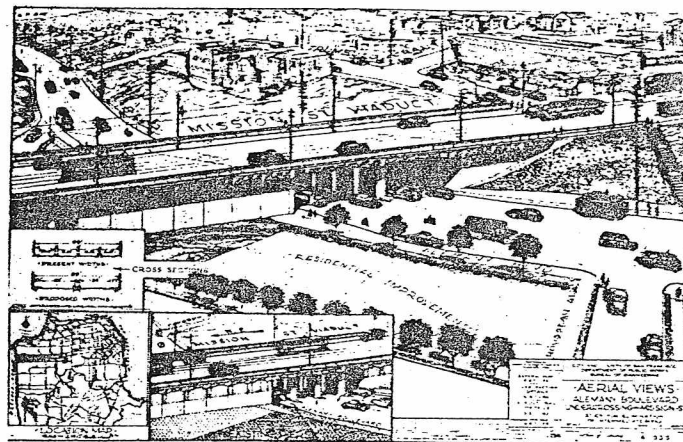
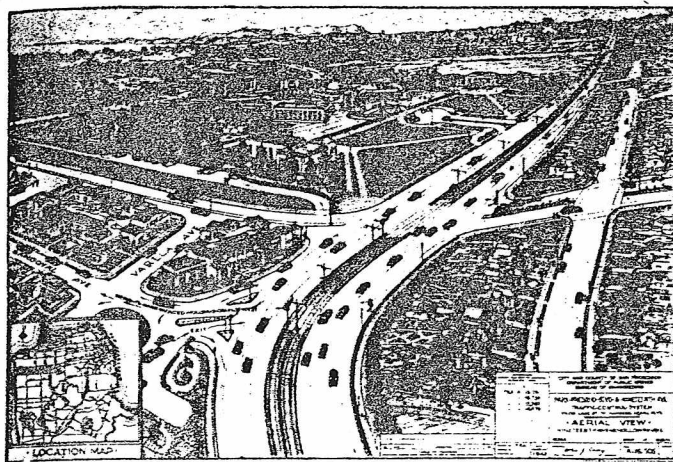
Third St.—Custer to Bayshore—channelize and repave.
Persia Ave. Extension—new street.
Geneva Avenue Extension—new street.
Geary Boulevard, Masonic to Bernal Cut—widened.
Masonic Ave.—Geary Blvd. to Bush St.—new street.
Alemany Boulevard—Mission easterly—repave.
Bayshore Boulevard—Marin to Water-

loo—repave.
Evans Avenue bridge—new bridge.
Mission Street viaduct over Alemany—new.
Junipero Serra Blvd. at Stanley Drive—grade separation.
Junipero Serra Blvd. at Alemany Blvd.—overpass.
Islais Creek Bridge at Third St.—new bridge.
Seventh Street—Mission to Townsend—widened roadway.
Powell Street—California to Broadway—widened roadway.
Industrial Street—Bayshore to Oakdale—improve.
Potrero, Tenth St. and Van Ness Ave.—new signals.

Most of the projects listed above are of a special nature and generally are necessary to supply a local district need. They are all financed from gasoline taxes with the exception of the Islais Creek Bridge, only 20 per cent of the cost of which is financed from ad valorem taxes.

The larger freeway and tunnel projects advocated by both the Department of Public Works and the City Planning Commission are quite costly and it would not be possible to finance them from the limited amount of funds made available





through gasoline taxes. We believe that they are necessary to facilitate the fast and safe movement of traffic through and around the City and must ultimately be constructed. Space is not available in this article to describe these projects. However, the following list will give the reader an idea of the types of improvements contemplated.

Portola Drive—Market Street Freeway, Broadway Tunnel.

Thirteenth Street and Division Street

Viaduct.

Waller Street improvement.

Mission Street improvement.

Extension of certain streets across Market Street.

Off street parking—motor terminals.

Market Street problems, etc.

Another important project is the rehabilitation of streets where streetcar tracks exist. This should be undertaken as a joint project by the Department of Public Works and the Public Utilities Commission.

It is perfectly evident, if San Francisco is to have these much needed improvements, that the money to pay for them must come from some other source than gasoline taxes. The recommendation that a general bond issue be voted to finance these projects was included in the report of the Citizens' Postwar Planning Committee, said bond issue to be undertaken after the bonds for the airport improvements had been approved.

At the present time, while the cost of money for public improvements is so

small, a general bond issue seems to be the best method of financing the work. The improvements would certainly make for better living in the community and we should delay no longer in acquiring them. Economically they are sound and will soon repay their original costs not only in time saved but also in the reduction of operation costs of the privately-owned motor vehicles and public transportation conveyances that will use them.

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STRATTON APPOINTED TO WESTERN PACIFIC STAFF

Frank B. Stratton, of San Francisco, was appointed industrial commissioner of the Western Pacific Railroad, effective July 1, to succeed James W. Grace, who retired at the end of the month.

This announcement was made by Henry E. Poulterer, vice-president in charge of traffic.

In commenting on the significance of this appointment, Mr. Poulterer said: "The territory served by Western Pacific Lines in California, Nevada and Utah is in the midst of an industrial expansion of considerable magnitude. Inquiries concerning prospective western industrial locations continue to be received at a rapid rate. With the steady increase in Pacific Coast population and the assurance of continued western steel production, we confidently expect that this westward industrial march will continue."

A THOUGHT FOR THE MONTH

By mutual confidence and mutual aid, great deeds are done and great discoveries made.—Homer's Iliad.

DRIVER TRAINING

Approximately 350 high schools of California offer courses in driver training to students approaching the age when they can obtain driver's licenses, the California State Automobile Association reports. It is expected that the number of schools offering this training will increase as more instructors and equipment become available.

PEDESTRIAN TOLL HIGH

Nearly two-thirds of the fatal traffic accidents in Los Angeles, 328 out of 500, during 1945 involved pedestrians, the California State Automobile Association reports.

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Vanished Landmarks of San Francisco

By DOUGLAS KLINE

The processes which made California great American State began just a hundred years ago. During this hundred years the pioneers labored and passed on. Landmarks have taken their place and disappeared. Cities have come into existence, and become ghost towns; but San Francisco in spite of all vicissitudes remains. She has grown from a tiny trading post at Yerba Buena Cove to be one of the world's great cities. She has, more than this, become loved the world over. We believe that many of our readers have a sentimental attachment for the city of the past. We have therefore asked Mr. Kline to prepare a series of articles on the Vanished Landmarks of San Francisco, the third of which appears in this issue.—The Editor

Old San Francisco Mint

SAN FRANCISCO has never been developed as a railroad center. Perhaps it has been the facility with which water connections could be made, that has been the important factor in this fact. Sacramento was chosen as the terminal of the first Pacific Railroad because passengers and freight could be conveyed to San Francisco from that point by water. For many years the Southern Pacific maintained its terminal at Sacramento, and there it established large shops at which some of the finest locomotives ever constructed were built. When the first trains reached the bay, they made their terminal at Oakland, and the old S. P. ferries were one of the features of the bay for many years.

San Francisco has had only one main line railroad during its entire existence, and the story of the passing of the original right of way is to be related in the present article.

SAN JOSE TERMINAL

One of the projects to connect the Pacific Coast with the East designated San Jose as its terminal. San Francisco's first mainline railroad came into existence as a result of this scheme. As early as during the fifties there were efforts to promote a railroad between San Francisco and San Jose, but it was 1864 before a railroad was completed and in operation. Pete Donohue of Union Iron Works fame was one of the leading spirits in the enterprise. Several trans-continental railroad projects were in the making at the time and there was much manipulation for advantage. Donohue and his associates proposed to extend their railroad southward, eventually reaching Los Angeles.

The promoters of the Central Pacific saw in this a serious menace, and also because others threatened to reach the waters of the bay before them, they proceeded to negotiate for the road. In the late sixties the road, which was already known as the Southern Pacific, came into the hands of the "Big Four" and it eventually gave its name to the entire system. It was extended onward toward Los Angeles, and the complete connection was finally made at ceremonies at which Charles F. Crocker drove a golden spike at the junction of the northerly and southerly advancing rails, at Lang Station in Soledad Canyon, near Newhall, September 6th, 1876.

ORIGINAL LINE

The original line into San Francisco was constructed through a pass in the San Bruno hills past Ingleside and what is now Glen Park, through a deep cut, as it entered the outer Mission District near Saint Mary's Park, thence along Valencia street to a station which was situated in the vicinity of the location of the present housing project on Valencia street. This was near an old-time pleasure resort known as "The Willows."

Later the road was extended on to Market street. When the road came into the hands of the "Big Four" it was extended over the streets of the Mission down across a fill along the old Mission Creek to Third and Townsend.

There was but a single track, and this carried all of the traffic coming into the city by land from the southward. For many years the through trains of the Coast Line operated from the East Bay passing down to San Jose, and thence southward. In 1901 the "Daylight Limited" service was established on the westerly side of the bay and directly by land into San Francisco, thus making the city for the first time a direct mainline terminal. With this improved service a new problem presented itself. The operation of fast heavy trains over a single track which was also carrying mixed load traffic was a situation which could not well exist. The remedy was found in the construction of a new right of way along the bay shore through the South City hills.

ROUTE CONSIDERED

From the very inception of the San Jose Railroad scheme this route had been considered, but the difficulties involved caused it to be abandoned in favor of the Mission route. When it was found necessary to have a double track and modern construction, the Southern Pacific company, then under the leadership of Edward H. Harriman, who is to be remembered as one who courageously stood by San Francisco in the time of disaster, found a remedy by cutting five tunnels through the hills and establishing a modern and level right of way. This was considered an important engineering feat at the time. Known as the "Bay Shore Cutoff," it shortened the distance to the peninsula by many miles and eliminated the heavy grades of the Mission route.

The cutoff was opened for traffic in 1907, and thereafter only local trains used the Mission connection. However, there was a regular train service through the Mission for some years, but gradually traffic fell off and after some years the Railroad commission granted permission to abandon the passenger service. The use of the right of way for freight continued a little longer, but in time permission was granted to abandon that part of the trackage which operated over the Mission highline.

CITY APPROPRIATED

While these changes were taking place the city had appropriated a part of the right of way for a modern automobile

(Continued on page 30)

A. P. Giannini

(Continued from page 6)

order, it will be his product. For the "boys" he has trained during the years think like he would like them to think. He has made sure of that. And, he has also made sure that none of them becomes so entranced with his own abilities that his hat size will have to be increased.

When that happens, the word will come from Giannini that it is time to revert to the old ways and philosophies that he has fashioned and proved successful through the years. If the change isn't made, well, Giannini will give a reasonable enactment of an all-powerful terrible, tempered Mr. Bang in action.

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Old Landmarks

(Continued from page 17)

freeway. The old deep cut was widened and a roadway for fast traffic laid down. Provision was made also to accommodate an extension of the Municipal Railway to Glen Park through the cut. This boulevard is now known as the "Bernal Cut" and it forms an important link in the highway system of the city. The railroad track was relaid but found little use. As the valiant little suburban locomotives which tugged their loaded trains up over the Mission grade disappeared, the residents of the district realized that they had been part of the life of the place, and their passing caused many regrets.

VALENCIA STATION

In time the Valencia station, which had once been a hub of activity, was written from the station list of the railroad. This was a very ordinary structure not unlike many other small stations, but at one time it accommodated a large share of suburban traffic. It was just across from the home of "Sunny Jim" Rolph at Twenty-fifth and Valencia, and was surrounded by small shops which depended upon the railroad passenger trade, and its closing caused an exodus of tradesmen from the vicinity. Eventually the building was demolished to make room for the construction of residences.

The old right of way remained in an abandoned state for some time before World War II and the rails and bridges began to accumulate rust. With the demand for materials which the war created and the search for all available metal the Mission connection was not overlooked. The rails were taken up and the bridges, including the beloved and picturesque Dolores street span, came down, and were sent to contribute to the war effort. The old-fashioned stone abutments were removed and steam shovels removed the fills. Almost over night structures occupied the land thus made available, and completely obliterated the old right of way.

FIRST STOP SIGN

It has been stated that the first "Stop—Look—Listen; Look Out For The Cars" crossing sign was erected on the Mission right of way.

Motor cars have taken over the old deep cut and the modern streamline trains dash through the tunnels of the Bay Shore cut-off and through one of San Francisco's beautiful residential districts, Visitation Valley. The first railroad connection of San Francisco, the Mission high-line, is no more.

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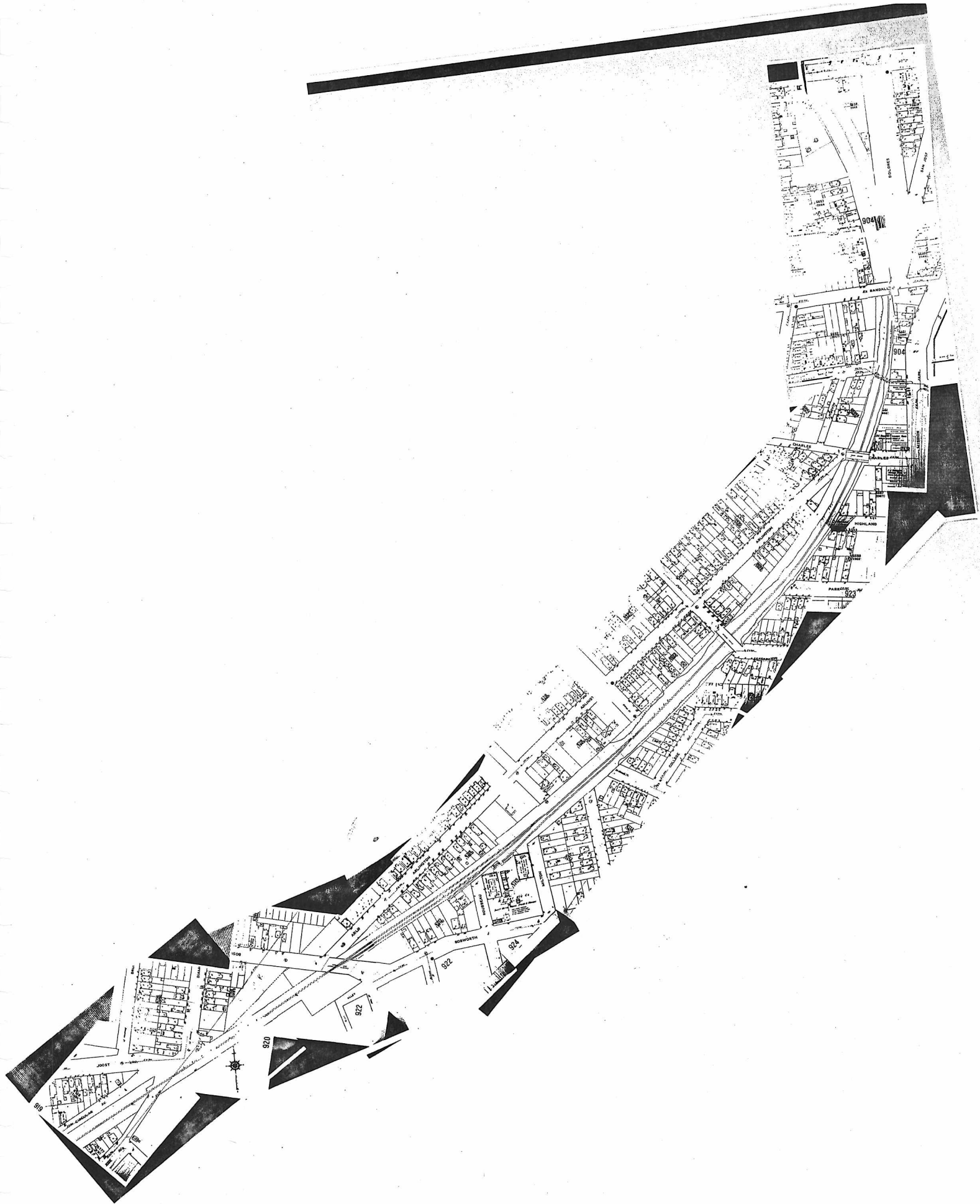
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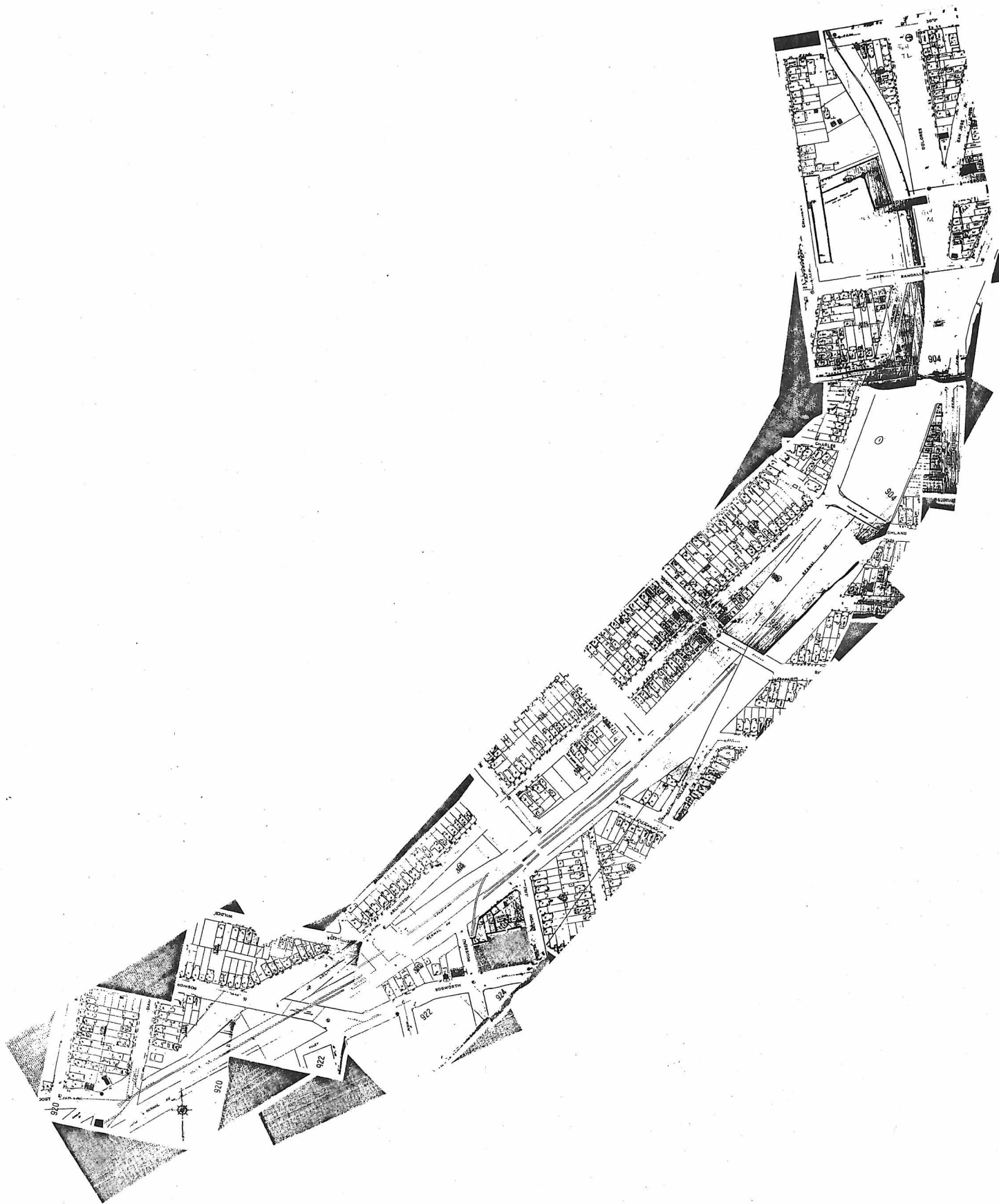
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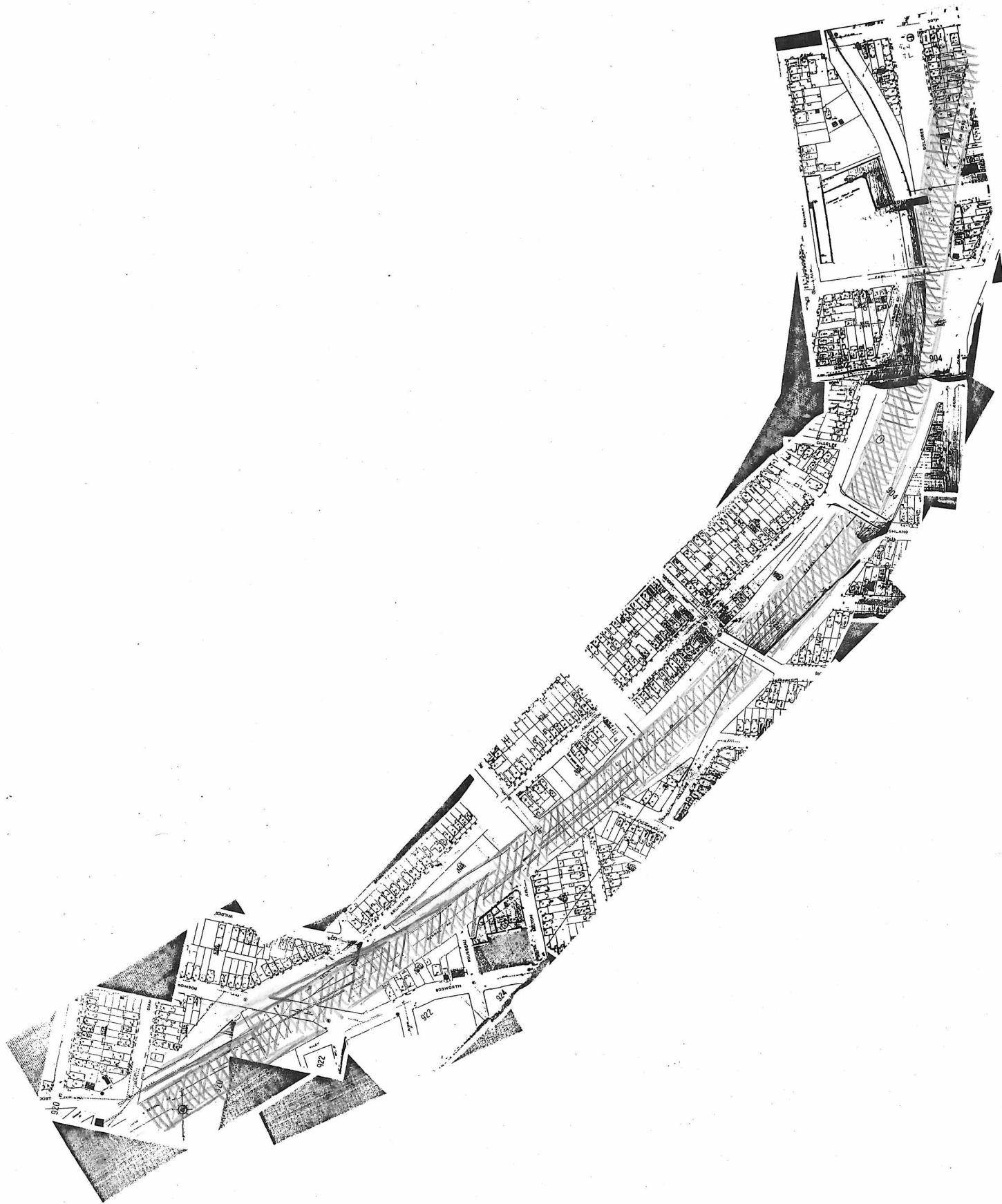
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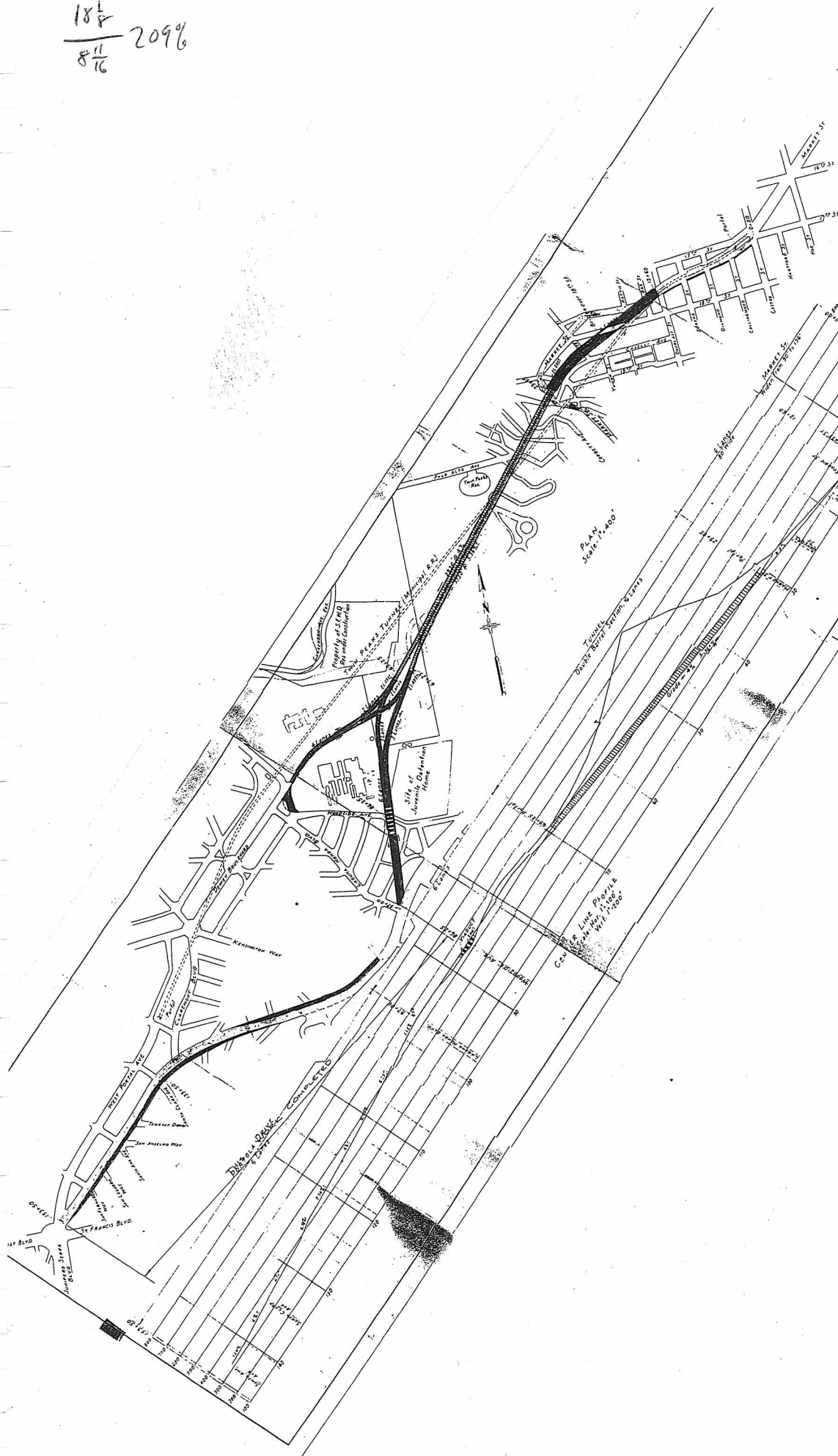
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